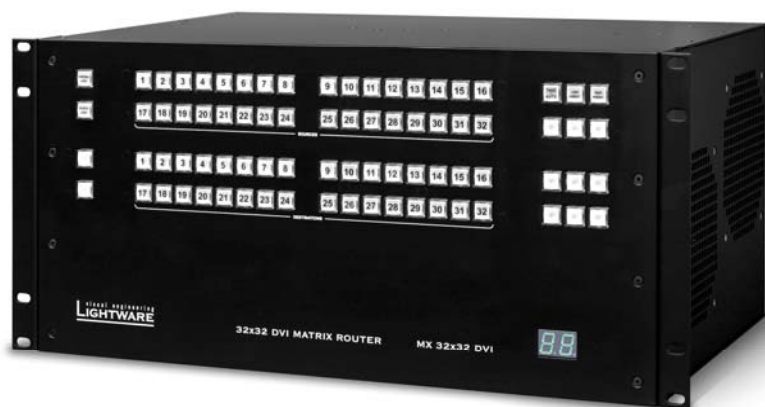


visual engineering
LIGHTWARE

**MX32x32DVI-Pro
MX16x16DVI-Pro
User's Manual**



SAFETY INSTRUCTIONS

Class I apparatus construction. This equipment must be used with a main power system with a protective earth connection. The third (earth) pin is a safety feature, do not bypass or disable it.

This equipment should be operated only from the power source indicated on the product.

To disconnect the equipment safely from power, remove the power cord from the rear of the equipment, or from the power source. The MAINS plug is used as the disconnect device, the disconnect device shall remain readily operable.

There are no user-serviceable parts inside of the unit. Removal of the top cover will expose dangerous voltages. To avoid personal injury, do not remove the top cover. Do not operate the unit without the cover installed.

The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.

The apparatus must be safely connected to multimedia systems. Follow instructions described in this manual.

Replacing the AC fuse

Unplug the AC power cord from the equipment

Locate the AC fuse on the rear of the unit

Replace only the AC fuse as indicated on the rear panel of the unit: 3.15A fast blowing

Connect the power cord to the switcher and to the AC power source. Make sure the switcher is working properly.

WEEE (Waste Electrical & Electronic Equipment)

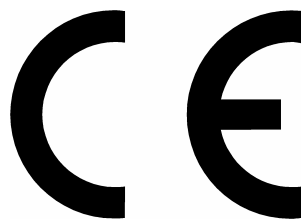
Correct Disposal of This Product



This marking shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.



DECLARATION OF CONFORMITY

We,

Lightware Kft. 1071 Budapest Peterdy str. 15 HUNGARY

as manufacturer declare, that the products

MX32x32DVI-Pro
MX16x16DVI-Pro
(Computer Matrix Switcher)

in accordance with the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EEC are in conformity with the following standards:

EMI/EMC EN 55103-1 E3, EN 55103-2

Safety EN 60065 Class I

Date: 01 September 2007

Name: Gergely Vida (Managing Director)

Signed:

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1 General description

1.1 Box contents

- Routing switcher
- User's manual
- IEC power cable
- CD-ROM with control software
- 2mm allen key
- RS 232 9 pole D-sub Male to Female cable
- UTP cross link cable

1.2 Modular router concept

MX32x32DVI-PRO and MX16x16DVI-PRO is a modular matrix switcher family that allows to build custom I/O sizes that meets the user's requirements. Different type of input and output cards gives the maximum flexibility for rental and installation signal transmission.

1.2.1 Router frames

MX-DVI-FR16	16x16 router frame with optional built in control panel
MX-DVI-FR32	32x32 router frame with optional built in control panel. Not compatible with MX-RJ45-DVI-IB; MX-RJ45-DVI-OB; MX-OPT-DVI-IB; MX-OPT-DVI-OB.
MX-DVI-FR16R	16x16 router frame with dual redundant power supply
MX-DVI-FR32R	32x32 router frame with dual redundant power supply

1.2.2 Input Cards

MX-DVID-IB	8 channel DVI-D (digital only) single link input card
MX-DVII-IB	8 channel DVI-I (digital DVI and analog RGB) input card containing 8 DVI-I connectors
MX-RJ45-DVI-IB	8 channel RJ-45 to DVI-D converter input card, used for DVI over CAT5 signal transmission
MX-OPT-DVI-IB-NT	8 channel fiber optical input card with built in fiber to DVI conversion – 4 duplex Neutrik Opticalcon connectors
MX-OPT-DVI-IB-LC	8 channel fiber optical input card with built in fiber to DVI conversion – 4 LC duplex connectors
MX-HDMI-IB	8 channel HDMI input card
MX-DVIDL-IB	4 channel dual link DVI-D (digital) only) input card

1.2.3 Output Cards

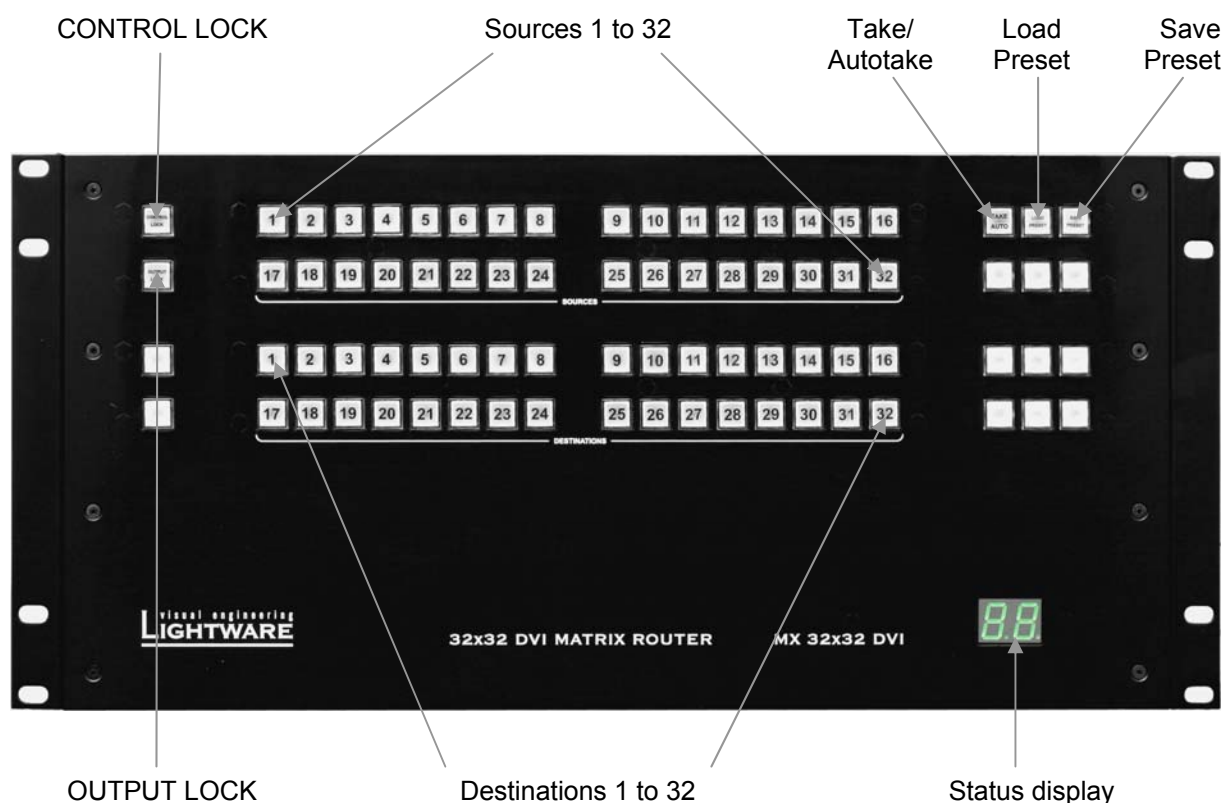
MX-DVID-OB	8 channel DVI-D (digital only) single link output card
MX-RJ45-DVI-OB	8 channel RJ-45 converter output card, used for DVI over CAT5 signal transmission
MX-OPT-DVI-OB-NT	8 channel fiber optical output card with DVI signal reclocking – 4 duplex Neutrik Opticalcon connectors
MX-OPT-DVI-OB-LC	8 channel fiber optical output card with DVI signal reclocking – 4 LC duplex connectors
MX-HDMI-OB	8 channel HDMI output card
MX-DVIDL-OB	4 channel dual link DVI-D (digital) only) output card

1.3 Features

- **50 meter input cable compensation** – Using 22AWG high quality DVI cable, the inputs are automatically compensated for up to 50 meter cable length, which extends installation possibilities even on highest HDTV or computer resolutions. In case of lower pixel resolutions, this length can be even higher.
- **Advanced EDID Management** – The user can emulate any EDID on the switcher's inputs independently, read out and store any attached monitor's EDID in 100 internal memory locations, upload and download EDID files using Matrix Control Software.
- **Non-blocking cross point matrix architecture** – The router allows any input to be switched to any output or more outputs simultaneously.
- **1.65 Gb/s channel transmission** – Routes any DVI single link signal between 25 and 165 MHz pixel clock frequency conforming to DVI 1.0 standard or dual link depending on input card type.
- **Supports all HDTV resolutions** – 720p, 1080i and 1080p etc. without HDCP encoding - Unencrypted HDTV signals up to 165 MHz pixel clock frequency regardless of resolution are passed through MX32x32DVI-Pro
- **Signal Detect LED-s at each input connector** – Active DVI signals are detected: clock channel activity is green indicated, when signal is applied to the input.
- **Output PLL reclocking** – (removes jitter caused by long cables) each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.
- **Front panel buttons control** – 32/16 source select, 32/16 destination select, Take, Load preset, Save preset, Panel Lock, Output Lock
- **Relegendable buttons** – Each button has an easy removable flat cap and a translucent label which can be inserted under it to identify sources and destinations.
- **RS232 or RS422 control** – Simple ASCII based RS232 protocol is used for switching, preset calling, status request, etc.
- **Ethernet control** – TCP/IP Ethernet 10Base-T or 100Base TX (Auto-Sensing)
- **Built in WEB site** – easy access from a WEB browser to control and configure the switcher
- **Fiber cable support** – Self powered DVI fiber cables using +5V from DVI sources (VGA cards, etc.) usually consume more than 50 mA, which load is maximum allowed by DVI 1.0 standard. MX32x32DVI-Pro supports +5V 500 mA constant current output on each DVI output to power long distance fiber optical cables.
- **Universal power supply** – MX32x32DVI-Pro accepts AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency on standard IEC connector.
- **Power failure memory** – In case of power failure the unit stores its latest configuration, and after next power up it loads automatically.

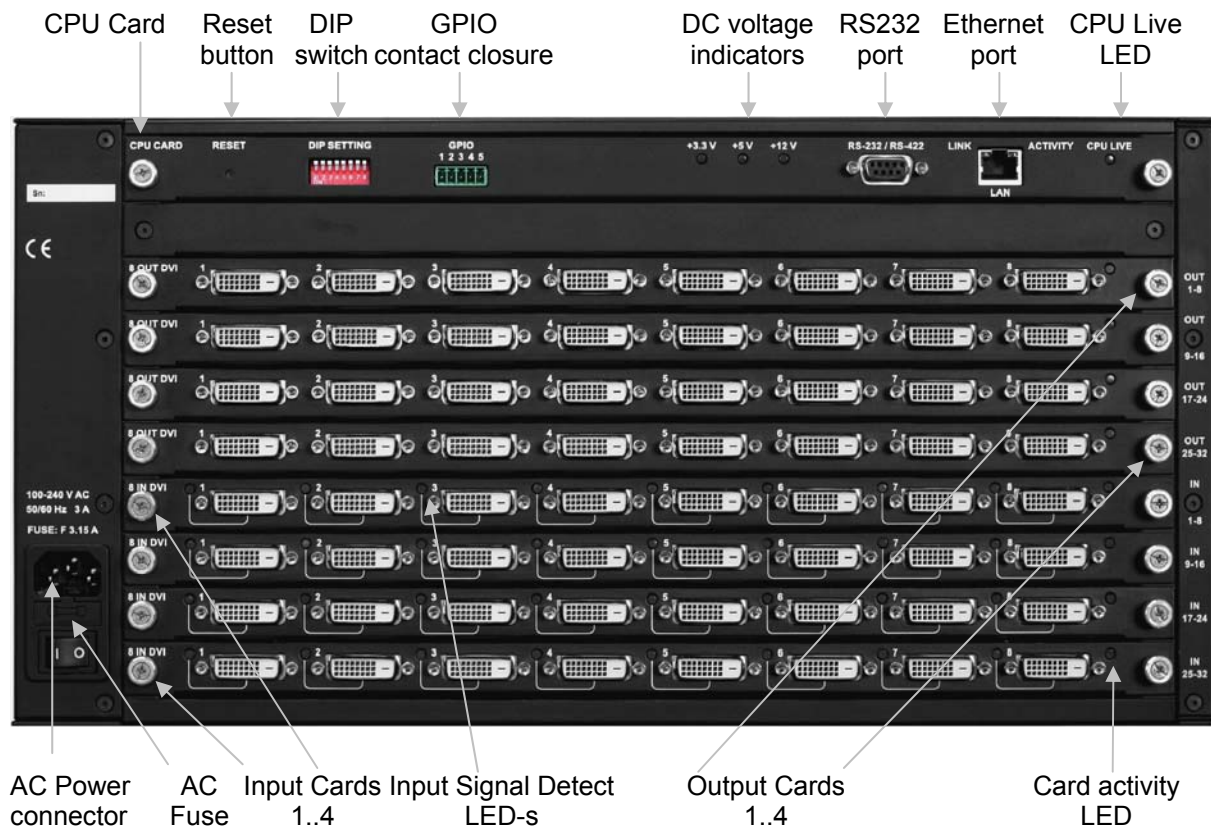
1.4 Front and rear view

1.4.1 Front Panel view



Control Lock	Disables or enables front panel operation. When red illuminated, operations on front panel are prohibited.
Output Lock	Locks and protects one (or more) outputs. Inhibits accidental input changing on protected output.
Sources	Source buttons have three functions: to select an input, to select a preset and to view the selected input's state (take mode).
Destinations	Destination buttons have two functions: to select an output, or to view the selected output's state.
Take/Autotake	This button has two functions: displays the actual switching mode of the router or executes switching on TAKE mode.
Load Preset	Loads and executes a previously saved preset from one of the preset memories.
Save Preset	Stores actual matrix state, in one of preset memories.
Status display	2 digit LED display indicating self test, internal status, and error messages

1.4.2 Rear view



CPU card	The main control unit of the device
Reset button	Hardware reset button. Press to reset the whole frame. Crosspoints and presets will not be resetted.
DIP Switch	8 circuit DIP switch – not used in current version
GPIO Contact closure	Relay output for alarm signaling
DC voltage indicators	LED indicators for internal DC power voltages
RS 232/422 connector	9 pole Dsub female connector. Can be ordered with RS232 or RS422 control.
Ethernet port	RJ 45 connector. Remote control port for connecting the unit to Local Area Network.
CPU LIVE	Continuously blinking LED if the CPU works properly
AC Power	Standard IEC power connector. The router works with 100 to 240 Volts, 50 or 60 Hz power sources.
AC Fuse	Replace with F 3.15 A type only.
Input cards	MX-DVID-IB: input board with 8 set of 24 pole single link DVI-D digital-only female receptacle connectors. Connect DVI source devices to these connectors.
Input signal LED-s	Indicates input signal presence (TMDS clock channel active) on associated input connector: Green lighting when signal is present.
Output cards	MX-DVID-OB: output board with 8 set of 24 pole single link DVI-D digital-only female receptacle connectors. Connect DVI sink devices to these connectors.

1.5 Electrical connections

1.5.1 DVI inputs

MX32x32DVI-Pro provides 24 pole „digital only” DVI-D connectors for input connections. Always use high quality DVI cable for connecting sources and displays.

Each input has a built in signal detection circuit with an LED located next to the input connector. The LED lights green, if the associated connector has an active DVI clock signal applied.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-
2	TMDS Data2+	10	TMDS Data1+	18	TMDS Data0+
3	TMDS Data2 Shield	11	TMDS Data1 Shield	19	TMDS Data0 Shield
4	nc	12	nc	20	nc
5	nc	13	nc	21	nc
6	DDC Clock	14	+5V Power	22	TMDS Clock Shield
7	DDC Data	15	GND (for +5V)	23	TMDS Clock+
8	nc	16	Hot Plug Detect	24	TMDS Clock-

Table1. - DVI-D "digital only" connector Single Link pin assignments

Cable length at inputs

MX32x32DVI-Pro has an advanced built in cable compensation circuit, which automatically provides cable length compensation. This circuit extends the maximum usable cable length to even 60 meter using high quality 22AWG copper cable on WUXGA 1920x1200 graphics resolution.

Cable type Signal	22 AWG	24 AWG
	Reference type DVI GEAR: SHR DVI	Reference type TASKER: TSK 1060
Resolution	Max length (meter)	Max length (meter)
1920x1200; 1600x1200; 2048x1080p; 1080p	60 m	50 m
1680x1050; 1400x1050; 1280x1024	75 m	62 m
1024x768; 1365x768; 720p; 1080i;	92 m	77 m
800x600	100 m	84 m
640x480; 480p; 576p	120 m	100 m

Table2. - Maximum DVI cable lengths at inputs

1.5.2 DVI outputs

MX32x32DVI-Pro provides 24 pole "digital only" DVI-D connectors for output connections. As standard DVI outputs, there can be used limited length cables, since there is no output amplification applied. For using longer cable runs at outputs, use fiber optical DVI cables or active DVI repeaters/extenders.

Output reclocking

MX32x32DVI-Pro reclocks the signal on all outputs. Signal reclocking is an essential important procedure in digital signal transmission. After passing the reclocking circuit, the signal becomes stable and jitter free, and can be transmitted over more equipment like processors, or event controllers. Without reclocking there can be seen sparkles, noise and jaggies on the image.

Fiber Cable powering

As special feature MX32x32DVI-Pro on DDC +5V output (pin 14 on output connectors) is able to supply 500 mA current to power fiber optical DVI cables. Standard DVI outputs or VGA cards supply only 55 mA current on +5V output, thus unable to power directly a fiber optical cable.

Info

MX32x32DVI-Pro does not check if the connected sink (monitor, projector or other equipment) supports Hotplug or EDID signals but outputs the selected signal immediately after switch command.

1.5.3 RS 232/422 control port

Lightware MX32x32DVI-Pro can be remote controlled through industry standard 9 pole sub-D female connector located on the rear panel of the unit. The router can be ordered with RS232 or RS422 control port.



RS 232 port pin locations

Pin nr.	RS 232	RS 422
1	NC non connected	TX- data transmit complement
2	TX data transmit	TX+ data transmit true
3	RX data receive	RX+ data receive true
4	DTR internally connected to Pin 6	RX- data receive complement
5	GND signal ground (shield)	GND signal ground (shield)
6	DSR internally connected to Pin 4	NC non connected
7	RTS internally connected to Pin 8	NC non connected
8	CTS internally connected to Pin 7	NC non connected
9	NC non connected	NC non connected

Table3. - RS232 and RS422 pin connections

1.6 Advanced EDID Management

MX32x32DVI-Pro provides an EDID Management feature with advanced functions that helps system integration. The built in EDID Router stores and emulates 100 EDID data plus all monitor's EDID that are connected to the output connectors. First 50 EDID are factory presets, while memories 50 to 100 are user programmable.

The router stores all attached monitors and projectors EDID for each output in a non volatile memory.

On all inputs there can be emulated different or same EDID, that are copied from EDID router's memory, or the attached monitor. For example, the router can be set up to emulate any device, that is connected to one of the outputs, and the EDID is automatically changed, if the monitor is replaced with an other.

EDID is independently programmable for all inputs without affecting each other. All input has it's own EDID circuit.

User must not disconnect DVI cables during change an EDID opposite to other manufacturer's products.

EDID Router can be controlled with included Matrix Control Software via RS232 port or Ethernet .

2 Operation

2.1 POWER

Connect the power cord to the router's IEC standard power input connector. MX32x32DVI-Pro is immediately powered ON when the power cord is connected to the AC source. The router does not have a power switch, it remains powered on, until AC line voltage is present.

After powered on, the unit performs a self test, then all front panel buttons light up for one second. During self test the two digit Status Display indicates the test phases. After the self test the router reloads its last configuration and it is ready to use. In case of hardware failure a two digit error code is displayed.

Info

At switching ON, the router reloads the latest settings which were used before it was turning off. MX32x32DVI-Pro has an internal emergency memory which stores all current settings, and ties configurations. This memory is independent from presets and invisible for the user. This built-in feature helps the system to be ready immediately in case of power failure or accidentally powering down.

2.2 FRONT PANEL OPERATIONS

2.2.1 TAKE / AUTOTAKE modes

The router has two different switching modes: TAKE and AUTOTAKE. If the TAKE button is unlit, TAKE mode is active. When the TAKE button is continuously lighting green, AUTOTAKE mode is selected.

Press and hold the TAKE button for two seconds to change between TAKE and AUTOTAKE modes.

TAKE mode allows the user to make multiple connections and deselections at once. This mode is useful when time delay is not allowed between multiple switchings.

AUTOTAKE mode is useful when immediate actions must be done or fast switching is needed between sources on a destination.

2.2.2 CONTROL LOCK

Front panel button operations can be enabled or disabled using CONTROL LOCK button, while RS232/422 control is still enabled. If it unlights, front panel button operations are enabled. If there is continuously red lighting, front panel operations are inhibited.

Press and release CONTROL LOCK button to toggle the control lock state.

2.2.3 SWITCHING

Creating a connection or multiple connections in TAKE mode

1. First press and release the selected source button. The pressed source button and all destination buttons which are currently connected to this source will light up. The dark remaining destination buttons are not connected to this source. This is an informative display about current status of the selected input. (view only)
2. Press and release the selected destination button or buttons which has to be connected to the selected source. The preselected destination button(s) start(s) blinking.
3. Press and release TAKE button to execute the tie or ties. Now the selected input is switched to the selected output or to the multiple outputs.

Deselecting or muting in TAKE mode

1. First press and release the selected source button. The pressed source button and all destination buttons which are currently connected to this source will light up. The dark remaining destination buttons are not connected to this source. This is an informative display about current status of the selected input. (view only)
2. Press and release the selected, green lighting destination button which has to be disconnected from the selected source. The pressed destination or multiple destinations will turn dark.
3. Press and release TAKE button to execute disconnection.

Info Deselected destinations are disconnected from any source, thus output devices will display black image or "no signal" message, or automatically will turn off.

Info Multiple switching and deselecting actions can be done simultaneously, during only one TAKE action.

Creating a connection in AUTOTAKE mode

1. Press and release the selected destination button. The pressed destination button, and the actually connected source button are lighting green. If no source is connected (the output is muted) no source button will light.
2. Press and release the selected input button. The switch action will be executed immediately. Switching between sources to the selected destination can be done directly.

Deselecting or muting in AUTOTAKE mode

1. Press and release the selected destination button. The pressed destination button, and the actually connected source button are lighting green. If no source is connected (the output is muted) no source button will light.
2. Press and release the active green lighting source button. The output is muted.

Info Deselected destinations are disconnected from any source, thus output devices will display black or blue image or "no signal" message and may automatically turn off.

2.2.4 SAVE or LOAD PRESETS

The unit has 32 user programmable presets. Each preset stores a configuration regarding all input connections for all outputs. All presets are stored in a non volatile memory, the router keeps presets even in case of power down. Memory numbers are assigned to source buttons 1 to 32 (MX32X32) or to 16 (MX16*16).

Saving a Preset in TAKE mode

1. Press and release SAVE PRESET button.
2. Press and release the desired source (memory address) button (source 1 to 32, or to 16)
3. Press and release TAKE button. Now the current configuration is stored in selected memory.

Info Preset save action always stores the current configuration for all outputs

Loading a Preset in TAKE mode

1. Press and release LOAD PRESET button.
2. Press and release the desired source (memory address) button (source 1 to 32 or to 16)
3. Press and release TAKE button. Now the selected preset is loaded.

Info Loading a preset always modifies all output states.

Saving a Preset in AUTOTAKE mode

1. Press and release SAVE PRESET button.
2. Press and release the desired source (memory address) button (source 1 to 32 or to 16). Now the current configuration is stored in the selected memory.

Info Preset save action always stores the current configuration for all outputs .

Loading a Preset in AUTOTAKE mode

1. Press and release LOAD PRESET button.
2. Press and release the desired source (memory address) button (source 1 to 32 or to 16). Now the selected preset is loaded.

Info Loading a preset always modifies all output states.

2.2.5 VIEW current state

User can check the current switching status on the front panel using front panel buttons. View mode is slightly different in TAKE or AUTOTAKE modes because of different switching philosophy of the two modes.

Info View mode does not mean, that the router has to be switched in different mode, viewing and switching can be done after each other, without pressing any special button.

View current state in TAKE mode

If the router is in TAKE mode, user can verify both input and output connections. In TAKE mode no accidental change can be done unless TAKE button is pressed.

Press and release a source button. Now the selected source button and all destination buttons will light up which are currently connected to the selected source. This informative display will remain for 5 seconds, then turns all buttons unlit.

If all source and destination and TAKE buttons are unlit (the unit is in TAKE mode, and no input was selected in last 5 seconds), press and release a destination button to see its current state. Now the source button which is connected to the selected destination will light up. If no source button is lighting, the selected destination is in muted state. Pressing another destination button, there can be seen the last pressed state of destination.

View current state in AUTOTAKE mode

In AUTOTAKE mode only states of destination can be viewed.

Press and release the required destination button. Now the source button which is connected to the selected destination will light up. If no source button is lighting, the selected destination is in muted state. Pressing another destination button, there can be seen the last pressed current state of destination.

2.2.6 OUTPUT LOCK

Using Lightware routers there is a possibility to lock a destination. This feature prevents an accidental switching to the locked destination in case of important signal. Locking a destination means, that no input selection or muting can be done on that particular destination.

Destinations can be independently locked or unlocked. Locking a destination does not affect other destinations.

Output Lock in TAKE mode

1. Press and release the required destination button. Now the selected destination button and the currently configured source button light up (view mode)
2. Press and release the Output Lock button. Now the Output Lock button lights up in red colour.
3. Press and release TAKE button. The desired destination is locked now.

Unlock in TAKE mode

1. Press and release the required destination button which was previously locked. Now the selected destination button and the currently configured source button and the Output Lock button light up.
2. Press and release the Output Lock button (deselect). Now the Output Lock button turns off, however the locking function has not been cancelled yet.
3. Press and release TAKE button. The desired destination is unlocked now.

Output Lock in AUTOTAKE mode

1. Press and release the required destination button. Now the selected destination button and the currently configured source button light up (view mode)
2. Press and release the Output Lock button. Now the Output Lock button lights up in red colour, and lock function is activated. No source can be changed at the locked destination.

Unlock in AUTOTAKE mode

1. Press and release the required destination button which was previously locked. Now the selected destination button and the currently configured source button and the Output Lock button light up
2. Press and release the Output Lock button (deselect). Now the Output Lock button turns off, and the locking function has been cancelled.

3 RS 232 / 422 control

MX32x32DVI-Pro can be ordered with either RS232 or RS422 communication port. The port settings are done in the factory. D-sub connector pin assignments can be found on chapter 1.

Changing and viewing protocols

MX32x32DVI-Pro is equipped with multiple router protocols.

1. Switch the router to TAKE mode if used previously in AUTOTAKE mode by pressing TAKE button for 2 seconds. (TAKE will not light continuously.)
2. Press and release Control Lock (Control Lock button lights in red colour continuously)
3. Press and keep pressed Output Lock button. Now one of the source buttons will light up (view protocol):

If Source#1 button lights: Lightware protocol is active

If Source#2 button lights: Protocol#2 is active
4. During Output Lock pressed, press the desired Source button, accordingly to the new protocol. The desired Source button starts blinking, the router performs a reset and all buttons light up for 4 seconds. Now the new protocol is active.

Port settings:

The device uses standard RS-232 interface with the following settings:

9600 Baud
8 data bit
1 stop bit
no parity
null modem cable

The protocol description hereinafter stands for Lightware protocol.

The matrices accept commands surrounded by curly brackets - { } - and responds data surrounded by round brackets - () - only if a command was successfully executed. Input, output numbers and values must be sent as two digit ASCII numbers.

Control commands:

Legend :

ii	=	input number in 1 or 2 digit ASCII format (01,5,07,16 etc.)
oo	=	output number in 1 or 2 digit ASCII format
CrLf	=	Carriage return, Line feed (0x0D,0x0A)
•	=	space character (0x20)
→	=	command issued by the controller
←	=	response received from the router

3.1 Switching and control commands

3.1.1 Switch one input to one output

Description: Switch input ii to output oo.

Command	{ii@oo}
Response	(Ooo●Iii)CrLf

Example: Connect input 1 to output 5.

→ {1@5}
← (O05 I01)CrLf

3.1.2 Switch one input to all outputs

Description: Switch input ii to all outputs.

Command	{ii@O}
Response	(Iii●All)CrLf

Example: Switch input 1 to all outputs.

→ {01@O}
← (I01 All)CrLf

3.1.3 View connection on the specified output

Description: View connection on output oo.

Command	{?oo}
Response	(Ooo●Iii)CrLf

Example: View connection on output 5.

→ {?05}
← (O05 I01)CrLf

3.1.4 View connection on all outputs

Command	{VC}* (ALL●O1●O2●O3●O4●O5●O6●O7●O8● O9●O10●O11●O12●O13●O14●O15●O16● O17●O18●O19●O20●O21●O22●O23●O24● O25●O26●O27●O28●O29●O30●O31●O32●)CrLf
Response	

Description: Response length depends on the router's type (length = 16 for MX16x16 frame, length = 32 for MX32x32) and is independent from the number of installed outputs. The response above supposes a router having 32 outputs. The 16x16 frame responds only 16 outputs. Indexes show the actual output and the number at the given index shows which input it is connected to. If value O5 equals 04 it means that output 5 is connected to input 4.

O1..O32 are two digit ascii characters. (01, 02, 04, etc.)

* MX32x32 frames always respond 32 outputs while MX16x16 frames always respond 16 outputs.

Example 1: View connection on all outputs

(MX32x32)	(MX16x16)
→ {VC}	→ {VC}
← (ALL 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32)CrLf	← (ALL 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16)CrLf

Legend 1: output 1 is connected to input 1, output 2 is connected to input 2...output 32 is connected to input 32, this is the so called „diagonal pattern”.

Info Note that a space character is sent after the last output

Info If an output is locked, muted, or both locked and muted, the response format changes. If outputs are muted you get a letter 'M', if locked a letter 'L' and if muted and locked at the same time 'U' before the 2 digit numbers.

Info The router will always respond 32 output states regardless of the installed output cards, as the number of outputs correlates to the frame and not to the number of installed outputs.

Example 2:

(MX32x32)	(MX16x16)
→ {VC}	→ {VC}
← (ALL M01 L02 U03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32)CrLf	← (ALL M01 L02 U03 04 05 06 07 08 09 10 11 12 13 14 15 16)CrLf

Legend 2: The connections are almost the same as in example 1, but output 1 is muted, output 2 is locked to input 2 and output 3 is muted, and locked to input 3.

3.1.5 View mutes on all outputs

Command	{VM}*
Response	(MUT•M1•M2•M3•M4•M5•M6•M7•M8• M9•M10•M11•M12•M13•M14•M15•M16• M17•M18•M19•M20•M21•M22•M23•M24• M25•M26•M27•M28•M29•M30•M31•M32•)CrLf

Description: The length of the response depends on the number of outputs installed in the router. The response above supposes a router having 32 outputs. Indexes show the actual output and the number at the given index shows its state. If the value M5 equals 1, it means that output 5 is in mute, if 0, output 5 is not muted.

* MX32x32 frames always respond 32 outputs while MX16x16 frames always respond 16 outputs.

Example:

(MX32x32)		(MX16x16)	
→	{VM}	→	{VM}
←	(MUT 1 0 0 1 0)CrLf	←	(MUT 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0)CrLf

Legend: Output 1 and 4 are muted while the other outputs are unmuted.

3.1.6 Mute specified output

Description: Mute output oo.

Command	{#oo}
Response	(MUToo)CrLf

Example: Mute output 5.

→ {#05}
← (MUT05)CrLf

3.1.7 Unmute specified output

Description: Unmute output oo.

Command	{+oo}
Response	(UMT00)CrLf

Example: Unmute output 5. Now output 5 is switched to the input it was connected to prior to the mute command.

→ {+05}
← (UMT05)CrLf

3.1.8 Lock specified output

Description: Locks output oo. No other input can be routed to this output until it is locked.

Command	{#>oo}
Response	(1LOoo)CrLf

→ {#>11}
← (1LO11)CrLf

Example: Lock Output 11.

Info

If an output is locked to an input, neither preset loading nor switching can modify this connection.

3.1.9 Unlock specified output

Description: Unlocks output oo. Presets can be loaded to this output and routing is working as well.

Command	{+<oo}
Response	(0LOoo)CrLf

Example: Unlock the previously locked output 11.

→ {+<11}
← (0LO11)CrLf

Info

The router issues the above response regardless of the previous state of the output oo (either it was locked or unlocked).

3.1.10 Save preset to the specified memory location

Description: Save current ties to preset zz.

Command	{ \$zz }
Response	(SPRzz)CrLf

Example: Save current connections to preset memory 7.

→ { \$07 }
← (SPR07)CrLf

Info: The router saves the mute state of the outputs as well.

Info: Lock states are not saved. Lock state is assigned to the physical output of the router. Presets don't affect output locks.

3.1.11 Load preset from the specified location

Description: Load preset zz.

Command	{ %zz }
Response	(LPRzz)CrLf

Example: Load connections previously saved to preset memory 7. All connections will be reloaded.

→ { %07 }
← (LPR07)CrLf

Info: The router loads the mute state of the outputs as well.

Info: Lock states are not loaded. Lock state is assigned to the physical output of the router. Presets don't affect output locks.

3.1.12 Reload factory default PLL setup

Description: Reloads factory default PLL setup to all outputs.

Command	{ r00 }
Response	(DVP●P1●P2●P3●P4●P5●P6●P7)CrLf

Example:

→ { r00 }
← (DVP 37 80 88 0D 34 00 05)CrLf

Legend: P1..P7 are the default parameters for the particular output.

3.2 Router Status commands

3.2.1 View product type

Command	{i}
Response	(PRODUCT_TYPE)CrLf

Description:
DEVICE_NAME format:

	Number of inputs		Number of Outputs	Device type
MX		X		DVI

Example 1: The connected router is a 32x32 frame → {i}
← (MX32X32DVI FRAME)CrLf

Example 2: The connected router is a 16x16 frame → {i}
← (MX16X16DVI FRAME)CrLf

3.2.2 View serial number

Description: SERIAL_NUMBER format:

Command	{s}
Response	(SERIAL_NUMBER)CrLf

	8 -1byte long- ASCII numbers
SN:	iixxxxxx

Example: The connected serial number of the router is: 06050100. → {s}
← (SN:06050100)CrLf

Info

Only the last 4 numbers are written onto the back of the router

3.2.3 View Firmware version of the CPU

Description: View the CPU firmware revision. To view the other controller's firmware revision see command 'Query cards' firmware' {FC}.

Command	{f}
Response	(FIRMWARE_VERSION)CrLf

Example: The connected router's CPU has a firmware version of 1.10 → {f}
← (FW:1.1.0)CrLf

3.2.4 View Router's health

Description:

Command	{st}
Response	"(STAT 3.3V 5V 12V temp rpm1 rpm2)"(CrLf)

Legend:

3.3V	-	System voltage
5V	-	EDID voltage
12V	-	FAN voltage
temp	-	System Temp.in °C
rpm1	-	FAN1 speed
rpm2	-	FAN2 speed

3.2.5 View Installed i/o cards' hardware

Description: Shows the hardware name and revision of the installed cards'

Command	{is}
Response	(SL# 0 MB_DESCRIPTOR)CrLf (SL# 1 OUTPUT_CARD_DESC)CrLf (SL# 2 OUTPUT_CARD_DESC)CrLf (SL# 3 OUTPUT_CARD_DESC)CrLf (SL# 4 OUTPUT_CARD_DESC)CrLf (SL# 5 INPUT_CARD_DESC)CrLf (SL# 6 INPUT_CARD_DESC)CrLf (SL# 7 INPUT_CARD_DESC)CrLf (SL# 8 INPUT_CARD_DESC)CrLf

Example:

MX32x32		MX16x16	
→	{is}	→	{is}
←	(SL# 0 MX-DVI-MB32 SCH_1.1 PCB_1.1)CrLf	←	(SL# 0 MX-DVI-MB16 SCH_1.0 PCB_1.0)CrLf
←	(SL# 1 MX-DVID-OB SCH_1.1 PCB_1.1)CrLf	←	(SL# 1 MX-DVID-OB SCH_1.1 PCB_1.1)CrLf
←	(SL# 2 MX-DVID-OB SCH_1.1 PCB_1.1)CrLf	←	(SL# 2 MX-DVID-OB SCH_1.1 PCB_1.1)CrLf
←	(SL# 3 MX-DVID-OB SCH_1.1 PCB_1.1)CrLf	←	(SL# 3 EMPTY SLOT)CrLf
←	(SL# 4 MX-DVID-OB SCH_1.1 PCB_1.1)CrLf	←	(SL# 4 EMPTY SLOT)CrLf
←	(SL# 5 MX-DVID-IB SCH_1.1 PCB_1.1)CrLf	←	(SL# 5 MX-DVID-IB SCH_1.1 PCB_1.1)CrLf
←	(SL# 6 MX-DVID-IB SCH_1.1 PCB_1.1)CrLf	←	(SL# 6 MX-DVID-IB SCH_1.1 PCB_1.1)CrLf
←	(SL# 7 MX-DVID-IB SCH_1.1 PCB_1.1)CrLf	←	(SL# 7 EMPTY SLOT)CrLf
←	(SL# 8 MX-DVID-IB SCH_1.1 PCB_1.1)CrLf	←	(SL# 8 EMPTY SLOT)CrLf

Legend (MX32x32 frame): The router has 4 input and 4 output cards (32x32) installed. All cards are single link DVI-D.

Legend (MX16x16 frame): The router has 2 input and 2 output cards (16x16) installed.

Preliminary: Naming conventions for future cards:

<i>MX-RJ45-DVI-IB SCH_1.0 PCB_1.0</i>	<i>Single link DVI-D input card with RJ-45 connector</i>
<i>MX-RJ45-DVI-OB SCH_1.0 PCB_1.0</i>	<i>Single link DVI-D input card with RJ-45 connector</i>
<i>MX-OPT-DVI-IB-NT SCH_1.0 PCB_1.0</i>	<i>Single link DVI-D input card with optical connector</i>
<i>MX-OPT-DVI-OB-NT SCH_1.0 PCB_1.0</i>	<i>Single link DVI-D output card with optical connector</i>
<i>MX-DVIDL-IB SCH_1.0 PCB_1.0</i>	<i>Dual link DVI-D input card with DVI-D connector</i>
<i>MX-DVDL-OB SCH_1.0 PCB_1.0</i>	<i>Dual link DVI-D output card with DVI-D connector</i>

3.2.6 View installed controllers' firmware

Description: Shows the firmware revisions of the installed programmed controllers

Command	{fc}
Response	(CF CARD_FIRMWARE)CrLf

Example:

(MX32x32)	(MX16x16)
→ {fc}	→ {fc}
← (CF MX-CP FW:1.0.2 @ 0X10)CrLf	← (CF MX-CP FW:1.0.2 @ 0X10)CrLf
← (CF MX-CP FW:1.0.2 @ 0X12)CrLf	← (CF MX-DVI-EDID FW:1.1.0 @ 0X20)CrLf
← (CF MX-DVI-EDID FW:1.1.0 @ 0X20)CrLf	

3.2.7 View current control protocol

Description: Shows the RS-232, TCP/IP control protocol

Command	{P_?}
Response	(CURRENT PROTOCOL = #1)CrLf

3.2.8 Set current control protocol

Description: Sets the current RS-232, TCP/IP control protocol (Default is '1')

Command	{P_x}
Response	(PROTOCOL #x SELECTED!)CrLf

3.3 EDID router commands

3.3.1 Route EDID to the selected input (static)

Description: Copies EDID from location LLL to input ii. LLL should be 1..100

Command	{ii:LLL}
Response	(E_SW_OK)CrLf (E_S_C) CrLf

Example:

```
→ {5:10}
← (E_SW_OK)CrLf
← (E_S_C) CrLf
```

3.3.2 Route EDID to the selected input (dynamic)

Description: Copies EDID from location LLL to input ii. Location LLL should be 101..132 as opposed to static routing where LLL should be between 1..100.

Command	{ii:LLL}
Response	(E_SW_OK)CrLf (E_S_C) CrLf

Info: Inputs 1..32 are mapped to logical addresses 101..132

After choosing dynamic EDID routing to one (or all inputs) the router will follow the EDID changes occurred on the output it was connected to.

Example:

```
→ {4:101}
← (E_SW_OK)CrLf
← (E_S_C) CrLf
```

After issuing this command the router will automatically copy the new EDID on output1 (remember logical address = 101) if it changes.

3.3.3 Route one EDID to all inputs

Description: Copies EDID from the selected location LLL to all inputs.

Command	{A:LLL}
Response	(E_SW_OK)CrLf (E_S_C) CrLf

Example:

```
→ {A:48}
← (E_SW_OK)CrLf
← (E_S_C) CrLf
```

3.3.4 Save EDID from output to memory location (Learn EDID)

Description: Learn EDID from the specified output oo to the specified location LLL

Command	{oo>LLL}
Response	(E_SW_OK)CrLf (E_S_C) CrLf

Example:

```
→ {24>101}
← (E_SW_OK)CrLf
← (E_S_C) CrLf
```

3.3.5 View EDID validity table

Description: Shows EDID validity table, which contains information about the EDID states.

Command	{wv}
Response	(EV VALIDITY_TABLE)CrLf

Example:

(MX32x32)	(MX16x16)
→ {wv}	→ {wv}
← (EV	← (EV
1111111111111111	1111111111111111
1111111111111111	1111111111111111
1111111111111110	1111111111111110
0011110000000000	0011110000000000
0000000000000000	0000000000000000
0000000000000000	0000000000000000
0000	0000
1111111111111111	1111111111111111
1111111111111111	1111111111111111
1111111111111111	1111111111111111)CrLf
1111111111111111)CrLf	

Legend*:

- '0' - invalid EDID
- '1' - valid EDID
- '3' - changed EDID

3.3.6 View EDID header

Description: EDID_HEADER consist of 3 fields:

Command	{whLLL}
Response	(EH#LLL EDID_HEADER)CrLf

- EDID manufacturer,
- Detailed timing block.** (The native resolution of the display device)
- display device's name.

* for more information see Router Initiated commands -> EDID status changed

Example:

Show the emulated EDID on DVI input#1 (for more information see session EDID Management: using EDID Router)

(MX32x32)		(MX16x16)	
→	{wh 133 }	→	{wh 117 }
←	(EH#133 NEC 1600X1200@60 LCD2170NX)CrLf	←	(EH#117 NEC 1600X1200@60 LCD2170NX)CrLf

Legend:

EDID manufacturer: NEC
Detailed timing block: 1600X1200@60
display device's name: 60 LCD2170NX

3.3.7 Upload EDID content from the router

Command	{weLLL}
Response	(EB#LLL B1 B2 B256)CrLf

Description: EDID hex bytes can be read directly. The router will issue the whole content of the EDID present on memory location LLL (256 bytes).

Legend: B1..B256 are space separated hex characters represented in ASCII format.

3.3.8 Download EDID content to the router

Description: EDID hex bytes can be written directly to the user programmable memory locations (locations #51...#100).

Sequence:

- Prepares the router to accept EDID bytes to the specified location LLL {WL#LLL}
- Router responds that it is ready to accept EDID bytes (E_L_S)CrLf
- Send 1 block of EDID (1 block consist of 8 bytes of hex data represented in ASCII format) {WB#1•B1• B2 •B3•B4•B5•B6•B7•B8}
- The router acknowledges (EL#•)
- Send another 31 blocks of EDID (32 altogether)
- After the last acknowledge, the router signals that the EDID status changed (E_S_C) CrLf

Command	{WL#LLL}
Response	(E_L_S)CrLf
Command	{WB#1•B1• B2 •B3•B4•B5•B6•B7•B8}
Response	(EL#•)CrLf
Command	{WB#2•B9• B10 •B11•B12•B13•B14•B15•B16}
Response	(EL#•) CrLf
.	
.	
.	
Command	{WB#248•B249• B250 •B251•B252•B253•B254•B255•B256}
Response	(EL#•) CrLf
Response	(E_S_C) CrLf

Example: Write 256byte of EDID to the first user programmable memory location (location#51).

```

→ {WL#51}
← (E_L_S)CrLf
→ {WB#1 00 FF FF FF FF FF FF 00}
← (EL#•)
→ {WB#2 22 F0 90 26 01 01 01 01}
← (EL#•)
.
.
.
→ {WB#32 00 00 00 00 00 00 00 00}
← (EL#•)
← (E_S_C)

```

3.4 Router Initiated commands

3.4.1 EDID status changed*

Description: This is sent after all commands which changes the EDID (EDID copy, EDID switch), or after a new EDID source ie. a new display device is connected to the router.

Command	Issued either after EDID switch or after connecting a new display device
Response	(E S C) CrLf

Example # 1: After routing EDID to a selected output. → {5:101}
← (E_SW_OK)CrLf
← (E S C) CrLf

Example # 2: After routing EDID to a selected output. Connecting a new display ie. a new LC display, to one output.

Info The router stores the last attached display device's EDID connected to the output. After disconnecting this device its EDID is still present at the router's memory, therefore no status change message is issued by the router if a display device having the same EDID is connected to that output. (The same display device is connected again, or another display device (same brand) from the the same manufacturer)

Info To keep your application in sync with the router it is recommended to issue a show validity ({wv}) command after receiveing EDID status changed response, and read all location indicating '3' in the table, as the change of these EDID triggered the EDID status changed response.

* See session: „EDID Management: using EDID Router”

3.4.2 Error responses

Invalid input number*

Description: Given input number exceeds the maximum number of inputs or equals zero.	Response	(ERR01)CrLf
---	----------	-------------

Invalid output number*

Description: Given output number exceeds the installed number of outputs or equals zero.	Response	(ERR02)CrLf
---	----------	-------------

Invalid value

Description: Given value exceeds the maximum allowed value can be sent.	Response	(ERR03)CrLf
--	----------	-------------

Invalid preset number

Description: Given preset number exceeds the maximum allowed preset number.	Response	(ERR04)CrLf
--	----------	-------------

*Info**The maximum preset number is limited to 32 for all routers.*

* The maximum i/o number is assigned to the router frame and is independent from the actual i/o configuration.

3.5 Commands – Quick summary

DVI signal control commands

Command description	See in chapter	Command
DVI / Switch one input to one output	3.1.1	{ii@oo}
DVI / Switch one input to all outputs	3.1.2	{ii@O}
DVI / View connection on the specified output	3.1.3	{?oo}
DVI / View connection on all outputs	3.1.4	{vc}*}
DVI / View mutes on all outputs	0	{vm}*}
DVI / Mute specified output	3.1.6	{#oo}
DVI / Unmute specified output	3.1.7	{+oo}
DVI / Lock specified output	3.1.8	{#>oo}
DVI / Unlock specified output	3.1.9	{+<oo}
DVI / Save preset to the specified memory location	3.1.10	{\$pp}
DVI / Load preset from the specified location	3.1.11	{%pp}
DVI / Reload factory default PLL setup	3.1.12	{r00}

EDID router commands

EDID ROUTER / Route EDID to the selected input	3.3.1	{ii:LLL}
EDID ROUTER / Route one EDID to all inputs	3.3.3	{a:LLL}
EDID ROUTER / Save EDID from output to memory location (Learn EDID)	3.3.4	{oo>LL}
EDID ROUTER / Error! Not a valid result for table.	0	{wv}
EDID ROUTER / View EDID header	3.3.6	{whLLL}
EDID ROUTER / EDID status changed	3.4.1	{---
EDID ROUTER / Upload EDID content from the router	3.3.7	{weLLL}
EDID ROUTER / Error! Not a valid result for table.	1.1.1	{wb}

Router Status commands

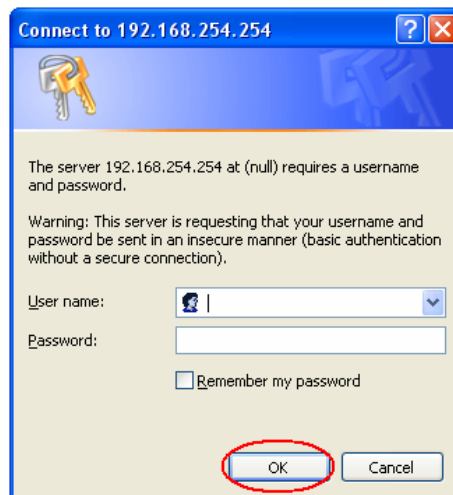
View product type	3.2.1	{i}*}
View serial number	3.2.2	{s}
View Firmware version of the CPU	3.2.3	{f}
View installed controllers' firmware	3.2.6	{fc}*}
View current control protocol	3.2.7	{P ?}
Set current control protocol	3.2.8	{P x}
Error! Not a valid result for table.	1.1.1	{st}
View Installed i/o cards' hardware	3.2.5	{is}

* MX32x32 frame responses and MX16x16 frame responses differs.

4 Ethernet setup

The matrix switchers can be controlled via ethernet identically the same way as via serial port. The same commands can be issued on the ethernet as on the serial port. The Ethernet settings can be accessed through Ethernet connection

Step 1. Enter current IP address into the address line of your browser, and press OK to proceed. (The default IP is 192.168.254.254)



Step 2. Select “Use the following IP configuration”. Enter your settings (the default is shown), then press OK to proceed.

Lantronix XPort Device Server - Windows Internet Explorer

http://192.168.254.254/secure/tlx_conf.htm

Lantronix XPort Device Server

LANTRONIX® Firmware Version: V6.1.0.0 MAC Address: 00-20-4A-A1-83-47

Network Settings

Network

Server

Serial Tunnel

Hostlist

Channel 1

Serial Settings

Connection

Email

Trigger 1

Trigger 2

Trigger 3

Configurable Pins

Apply Settings

Apply Factory Defaults

Obtain IP address automatically

Auto Configuration Methods

BOOTP: ☒ Enable ☐ Disable

DHCP: ☒ Enable ☐ Disable

AutoIP: ☒ Enable ☐ Disable

DHCP Host Name:

☒ Use the following IP configuration:

IP Address:

Subnet Mask:

Default Gateway:

Ethernet Configuration

☒ Auto Negotiate

Speed: ☒ 100 Mbps ☐ 10 Mbps

Duplex: ☒ Full ☐ Half

OK

Step 3. You can access the router on port:10001 by default, but you can modify this number to any port except the followings:

Lantronix XPort Device Server - Windows Internet Explorer

http://192.168.254.254/secure/tlx_conf.htm

Lantronix XPort Device Server

LANTRONIX® Firmware Version: V6.1.0.0 MAC Address: 00-20-4A-A1-83-47

Connection Settings

Network

Server

Serial Tunnel

Hostlist

Channel 1

Serial Settings

Connection

Email

Trigger 1

Trigger 2

Trigger 3

Configurable Pins

Apply Settings

Apply Factory Defaults

Channel 1

Connect Protocol

Protocol:

Connect Mode

Passive Connection:

Accept Incoming:

Password Required: ☐ Yes ☒ No

Password:

Active Connection:

Active Connect:

Start Character: (In Hex)

Modem Mode:

Mdm Esc Seq: ☒ Yes ☐ No

Pass Thru:

Endpoint Configuration:

Local Port:

☐ Auto increment for active connect

Remote Port:

Remote Host:

Common Options:

Telnet Mode:

Connect Response:

Terminal Name:

Use Hostlist: ☐ Yes ☒ No

LED:

Disconnect Mode

On Mdm_Ctrl_In Drop: ☐ Yes ☒ No

Hard Disconnect: ☐ Yes ☒ No

Check EOT(Ctrl-D): ☐ Yes ☒ No

Inactivity Timeout: : (mins : secs)

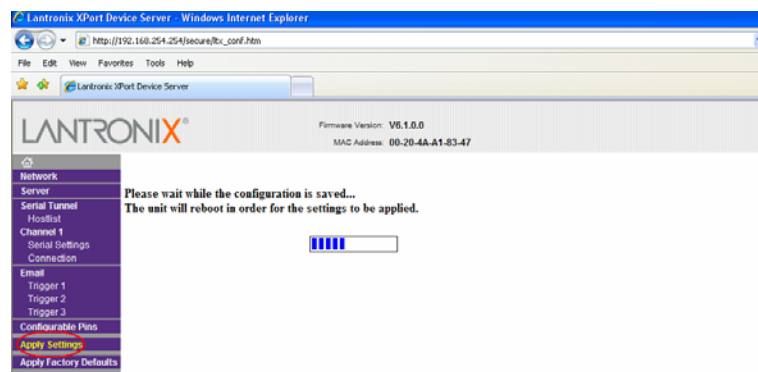
OK

Restricted port numbers:

1-1024, 9999, 14000-14009, 30704, 30718

Info:

Remember that the matrix control software uses this port only for ethernet communication.



Step 4. To finalize your settings press “Apply Settings”

If you are using the above setup, you can connect to the router two ways:

Controller

Connect to the router 192.168.254.254:10001

Lightware matrix controller application

Launch the application, it will automatically find all routers on the same subnet, and enumerates it under “Comm port” menu

5 Software control –Using Lightware Matrix Controller

The unit can be controlled using Lightware Matrix Controller from a PC computer or Laptop through RS 232 or Ethernet port.

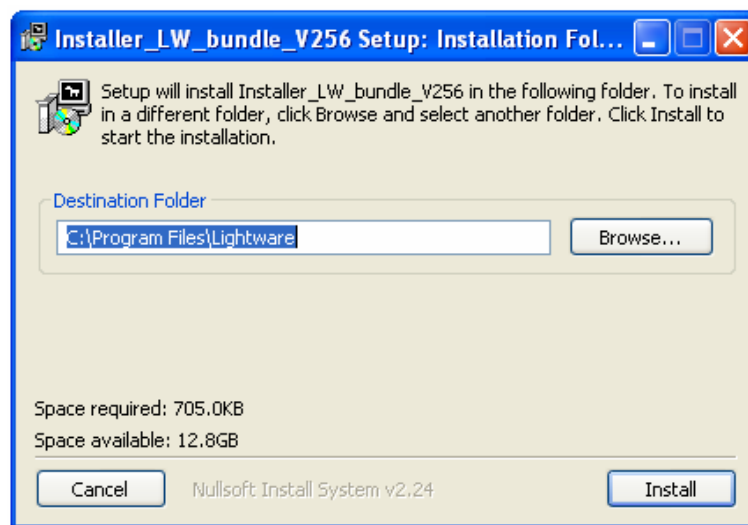
5.1 INSTALLING MATRIX CONTROLLER

Info If older version of control software is installed please uninstall it before installing a newer version (see section 7.)

Info The control software requires Java runtime environment v1.5 or higher. This can be found in the supplied CD's Java Installer directory, or downloaded from Sun's website:

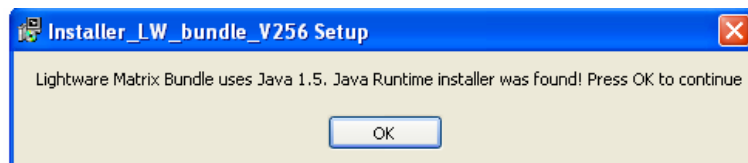
http://dlc.sun.com/jdk/jre-1_5_0_01-windows-i586-p.exe

Step 1. Run Installer_LW_bundle_v x.xx.exe
(x.xx refers to actual revision - currently v 2.56)



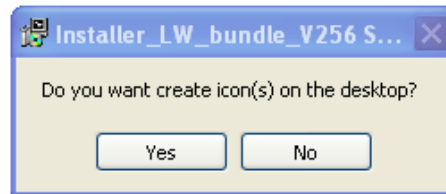
Step 2. Select destination folder and click Install (Using the default path is highly recommended)

Step 3. If Java is already installed the following pop-up window will appear:

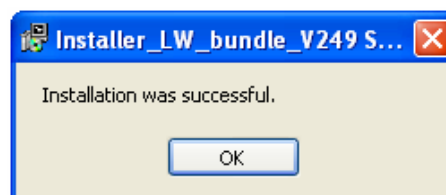


Step 4. Click OK button

- Step 5.** If you want to create desktop icon click Yes in the next pop-up window:



- Step 6.** After finishing the installation of Lightware Matrix Controller the following message appears:



- Step 7.** To run Lightware matrix control software find and click from Start menu->Programs->Lightware->**LW_matrix_controller_vXXX.jar** or from the desktop ikon (if this option was selected) via shortcut:



To uninstall the control software double click on: **Start** menu ->Programs->Lightware-> **Uninstall_LW_matrix_controller_vXXX.exe**

5.2 Using Lightware Matrix Controller

The unit can be controlled using Lightware Matrix Controller software from a PC computer or Laptop through RS 232 connection or Ethernet port.

Step 1. Connection between the Matrix switcher and the computer can be made via

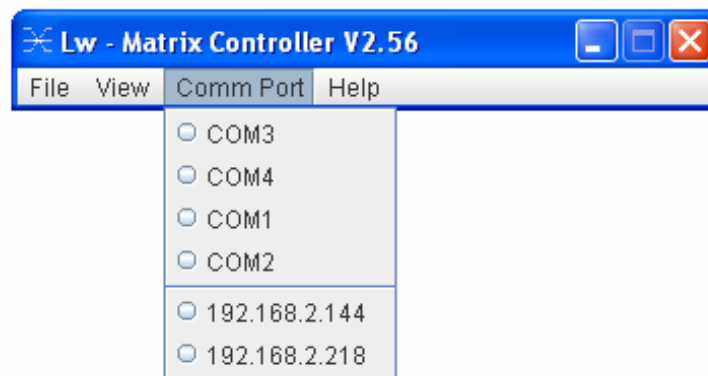
- serial port, with standard RS232 Male to Female cable
- Ethernet (with a HUB or to a simple endpoint)
- Ethernet directly (with cross UTP cable)

Step 2. Starting the application



To run the CONTROL SOFTWARE double click on LW_matrix_controller_vXXX icon on the desktop or select from Startmenu->Programs->Lightware->LW_matrix_controller_vXXX.jar)

Step 3. Select communication interface according to your actual connection:



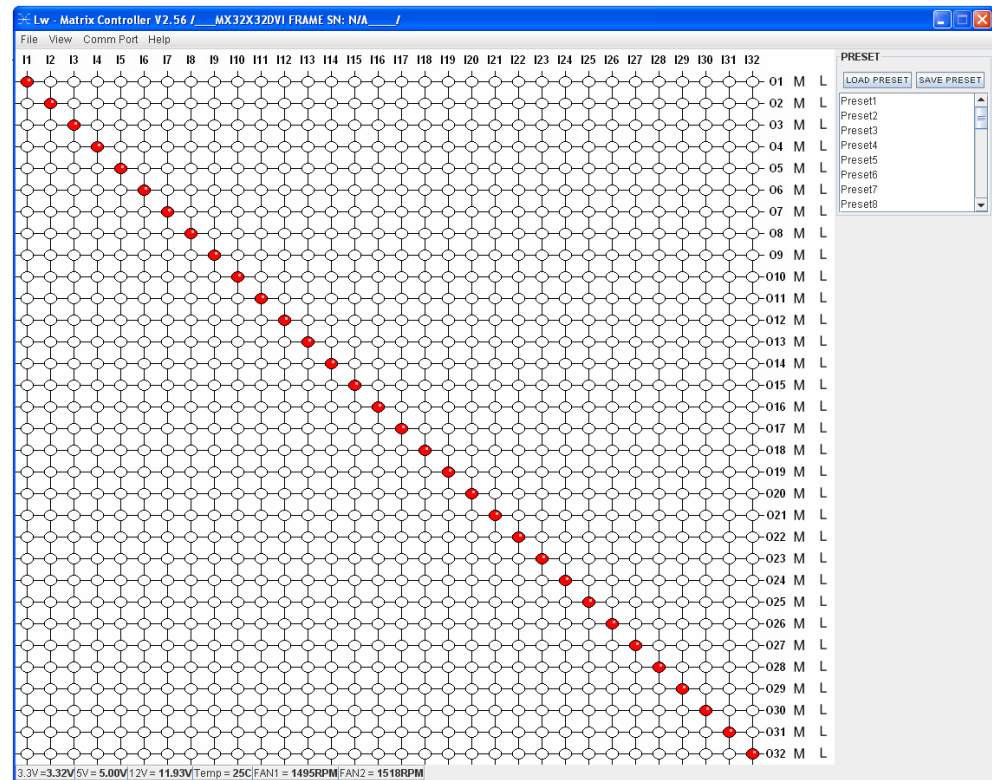
RS232 If the connection has been made via serial port, select the appropriate communication port from Comm Port drop-down menu.

IP If the connection has been made via ethernet select the desired IP address from Comm Port drop-down menu. No IP addresses will be shown if no Lightware LAN enabled matrix switcher is connected to the same network where the PC is.

Info After starting the Lightware Matrix Controller, it automatically searches for Lightware devices connected to the LAN. If finds any, it picks its IP address and puts into the Comm Port menu. If there is not any matrix switchers connected to the PC, only comm ports will be shown in this menu.

Info Only one user is allowed to connect to the matrix switcher via ethernet.

When the Lightware Matrix Controller finds the hardware, it defines the product type, and a button matrix area appears according to the input and output numbers of the router. I1; I2; I3...columns represents the inputs, the O1; O2; O3...rows the outputs. Each red bulb represents a valid connection.

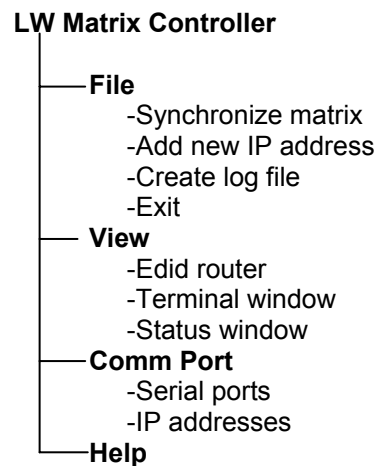


Info

After a successful connection has been established to a matrix switcher there is no difference between control via serial port and ethernet.

5.3 MENU Description

Matrix Controller contains the following menus and submenus:



5.3.1 File menu

File menu contains 3 items:

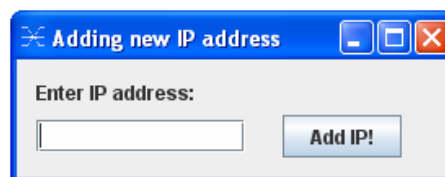
Synchronize matrix

Selecting Synchronize matrix will re-read connection information from the router and refresh the display.

Add new IP address

Selecting Add new IP address will display a new window where the user can add IP addresses of routers that are not in the same subnet.

Write a valid IP address and click Add IP!



Exit

Exit will terminate the application.

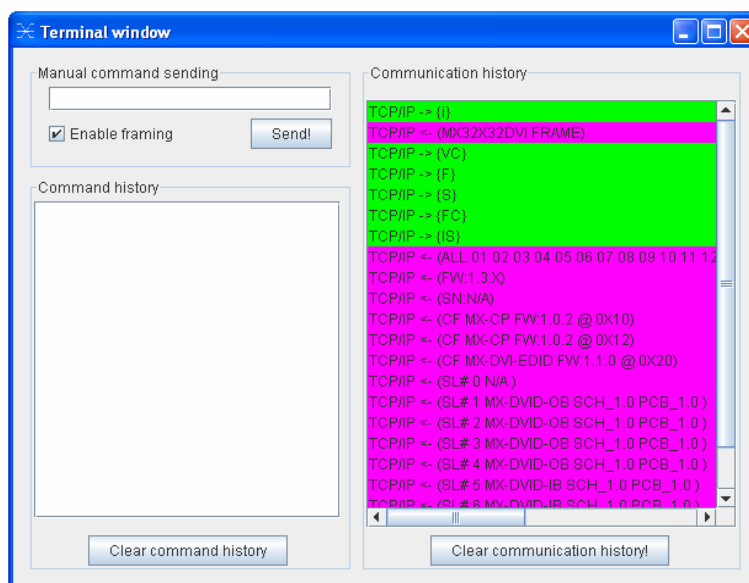
5.3.2 View menu

Edid router window

This item is gray and can not be selected if the connected device does not have EDID ROUTER installed. For more information see Section: EDID operation

Terminal window

This is a general purpose serial terminal mainly for test and debug purposes. After a successful connection to a router this terminal can be used either via serial or TCP/IP connection.



1. Manual command sending panel

There is a text area where the user can type in commands directly. By default Enable framing is checked, so commands are surrounded by framing brackets. Unchecking this box you can send multiple instructions in one command.

2. Command history

List the manually sent commands.

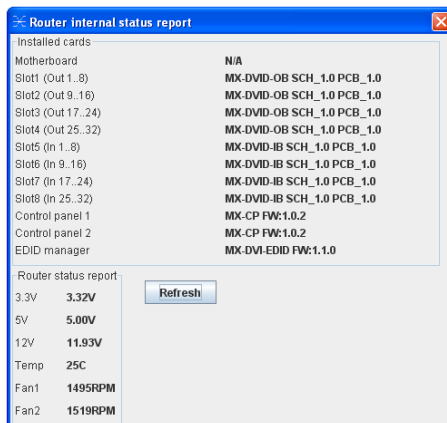
3. Communication history

All sent and received data is shown here. Every sent command and every received response get a prefix according to the following table, and have different background colors to distinguish.

	via TCP/IP	via serial
Sent	TCP/IP ->	UART ->
Received	TCP/IP <-	UART ->

Status window

Installed cards firmware, hardware revisions and the router's health is displayed in this window.



5.3.3 Comm Port menu

Comm Port menu contains 2 sections:

Serial ports available on the current PC

IP addresses found on the network

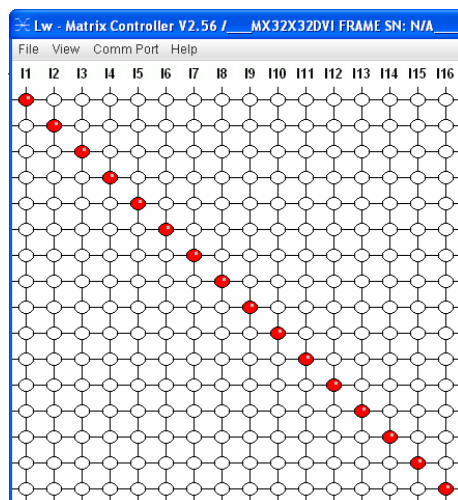
The IP addresses displayed in this window are those Lightware products, that are connected to the network. More than one units can be connected to one Local Area Network

5.4 I/O switching

I1; I2; I3...columns represents the inputs, the O1; O2; O3...rows the outputs.

Each red bulb represents a live connection.

For making a connection click on the desired empty bulb.



Mute outputs

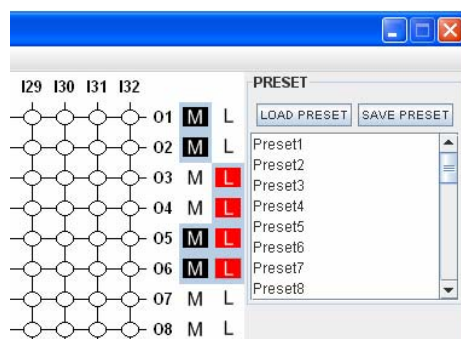
Outputs can be easily muted by clicking the button titled 'M' beside the output. This means that no signal is present at this output.

Info: Switching is permitted during mute.

Lock outputs

Outputs can be locked to any inputs. After locking an input to an output no switching is permitted to this output unless it is unlocked again.

Info: Loading a preset doesn't alter neither the lock state nor the switch state of a locked output. If an output is locked to an input before preset loading it will also be locked to that input after preset loading, so locked outputs ignore the preset.



Output states (to change state click on the icon)		
M	-	Unmuted
	-	Muted
L	-	Unlocked
	-	Locked

5.5 PRESET operations

Preset operations can be done via the right panel named PRESET. Each Lightware matrix switcher has 32 preset memories, that can be loaded and saved any time.

Front panel Preset operations effect only the first 8 preset memories, all others from 9 to 32 are available only via Matrix Controller software.

Info

A Preset setting stores a full configuration of all outputs, that effects all outputs, when loading a Preset.

5.5.1 SAVE PRESET

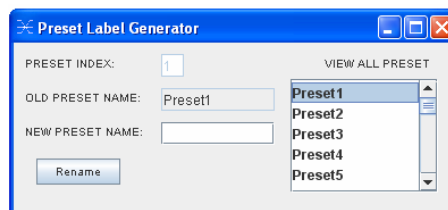
- Step 1.** Make the desired configuration on matrix switching area.
- Step 2.** Select the preset memory (Preset1...Preset32) where you want to save your current configuration
- Step 3.** Press SAVE PRESET button. Now the preset is stored.

5.5.2 LOAD PRESET

- Step 1.** Select the preset memory (Preset1...Preset32) you want to load as next configuration
- Step 2.** Press LOAD PRESET button. Now the preset is loaded
- Step 3.** The new I/O configuration is dispalyed on the matrix switching area.

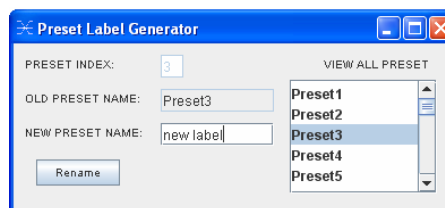
5.5.3 RENAME a preset:

Each preset has its own label (by default: Preset1..Preset32) which can be renamed. To modify these labels right-click on the preset list. The following window appears:



Example:

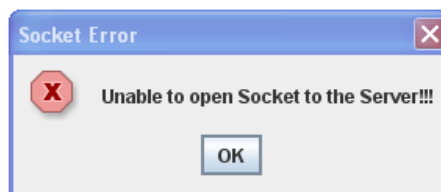
Select Preset3 and type the new preset name "new label", and click rename. The new name appears in the list. Close this window.



5.6 ERROR Messages

During remote operation there may happen some trouble with the communication. This case the Matrix Controller software displays error messages on the screen. Error messages are listed below:

Unable to open Socket to the Server!!!



Trigger: More than one user tries to access the router via LAN.

Explanation: Only one user can connect to the router at once.

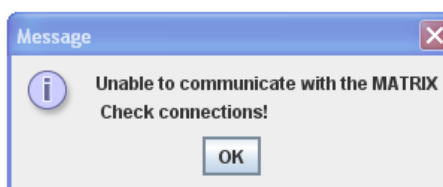
COM port error!!!



Trigger: The Matrix Controller software was unable to open the selected serial communication port on the PC.

Solution: Close any other application that uses the selected port, or try to use an other serial port. Do not forget to connect the serial lead to the right connector.

Unable to communicate with the MATRIX



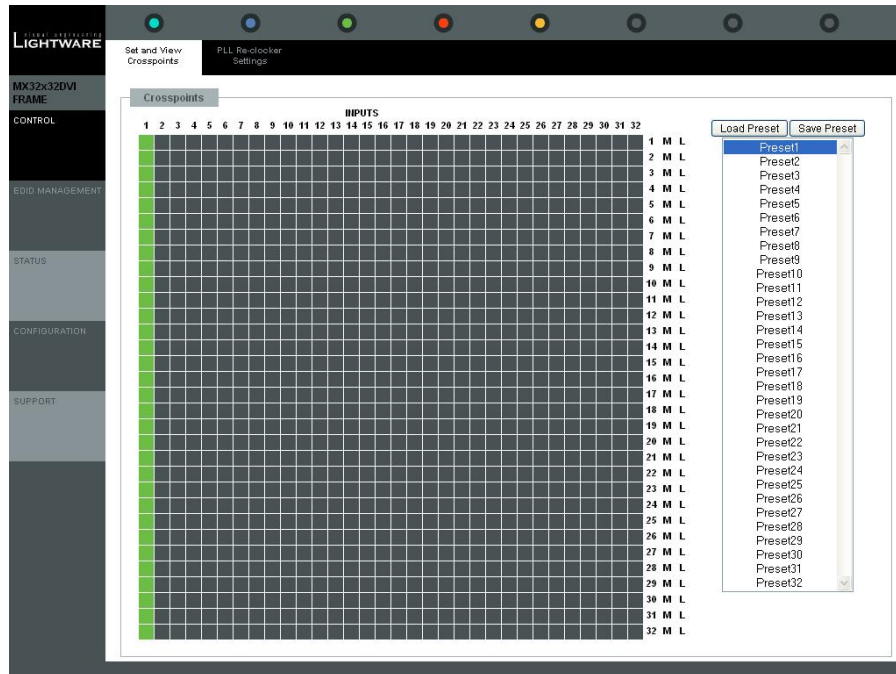
Trigger: No router was found on the specified port, or a command-response timeout has occurred.

Explanation: The Matrix Controller has tried to access a router on the specified comm port but no response was received within 2 secs.

Solution: Select the right serial port where the router is connected to, or try to do the last action again.

6 Web control – Using Lightware Web Manager

The main page of the Web Manager:



Compatible web browsers:

Microsoft Internet Explorer 6.0 or later versions

Mozilla Firefox version 1.5 or later versions (recommended)

6.1 Menu description

The Web Manager contains the following menus and submenus:

Control

The Control Menu has two submenus.

- **Set and View Crosspoints**

This menu appears by default, when the Web Manager starts.

It contains a matrix button area according to the input and output numbers of the router.

Columns represents the inputs, while rows are the outputs. The green squares represent the state of the matrix switcher.

The Preset selection box is on the right side of this page.

- **PLL Re-clocker Settings**

This menu contains advanced settings of the matrix router, such as PLL frequency, equalization etc...

EDID Management

By clicking on this menu, the Web Manager downloads the EDID list from the matrix. The user can view and modify the EDIDs.

Status

Installed cards firmware, hardware versions and the router's health is displayed in this page.

With the **Refresh** button the user can update the temperature, voltage and fan values.

Configuration

This page shows the current network configuration of the matrix, such as IP settings and port number.

Support

The contact information to Lightware Visual Engineering is shown in this page.

6.2 Crosspoint Operations

6.2.1 I/O switching

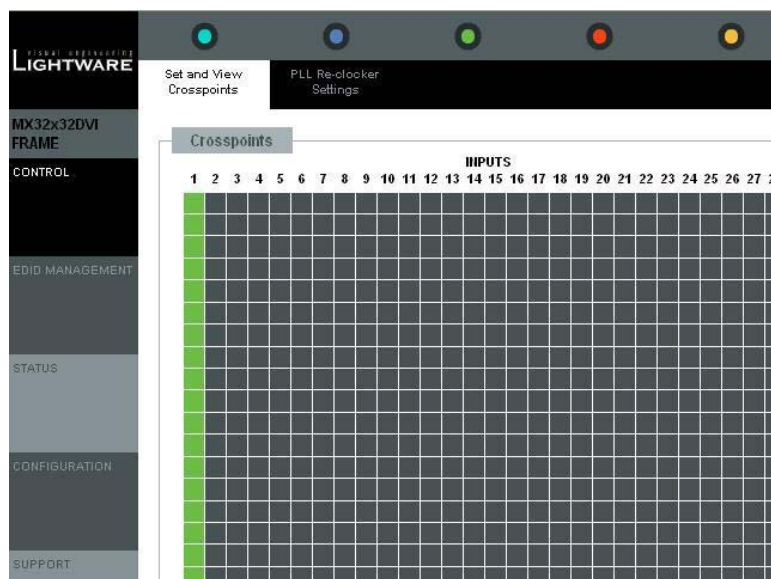
Click on **Control** menu

Select **Set and View Crosspoints**

I1; I2; I3... columns represent the inputs, the O1; O2; O3... rows represent the outputs

Each green square represents a live connection.

For making a connection click on the desired grey square.



6.2.2 Mute outputs

Outputs can be easily muted by clicking the button titled 'M' beside the output. This means that no signal is present at this output.

Info: Switching is permitted during mute.

6.2.3 Lock outputs

Outputs can be locked to any inputs. After locking an input to an output no switching is permitted to this output unless it is unlocked again.

Info:

Leading a preset doesn't change neither the lock state nor the switch state of a locked output. If an output is locked to an input before preset loading, it will also be locked that input after preset loading, so locked outputs ignore the preset.



	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
1																	M L
2																	M L
3																	M L
4																	M L
5																	M L
6																	M L
7																	M L
8																	M L
9																	M L
10																	M L
11																	M L
12																	M L
13																	M L
14																	M L
15																	M L
16																	M L
17																	M L
18																	M L

6.3 Preset operations

Preset operations can be done in the right panel of the **Control->Set and View Crosspoints** page. Each Lightware matrix switcher has 32 preset memories, that can be loaded and saved any time.

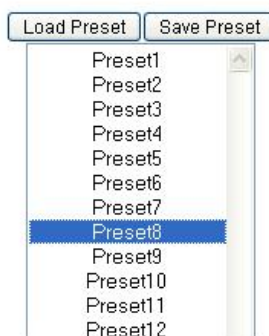
Front panel Preset operations effect only the first 8 preset memories, all others from 9 to 32 are available only via Matrix Controller software and Web Manager.

6.3.1 Save Preset

- | | |
|--------|--|
| Step 1 | Make the desired configuration on matrix switching area. |
| Step 2 | Select the preset memory location (Preset1...Preset32) where you want to save your configuration to. |
| Step 3 | Press Save Preset button. Now a message box appears that the preset is stored. |

6.3.2 Load Preset

- | | |
|--------|--|
| Step 1 | Select the preset memory location (Preset1...Preset32) you want to load as next configuration. |
| Step 2 | Press Load Preset button. Now the preset is loaded |
| Step 3 | The new I/O configuration is displayed on the matrix switching area. |



6.4 EDID Router operation

By clicking on the **EDID Management** menu, the EDID router page appears.

When the user enters the menu first, the Web Manager starts to download the whole EDID list from the matrix. It may take 2 minutes for the first time.

After the list is downloaded, the current status of the MATRIX SWITCHER EDID is shown on the three textboxes.

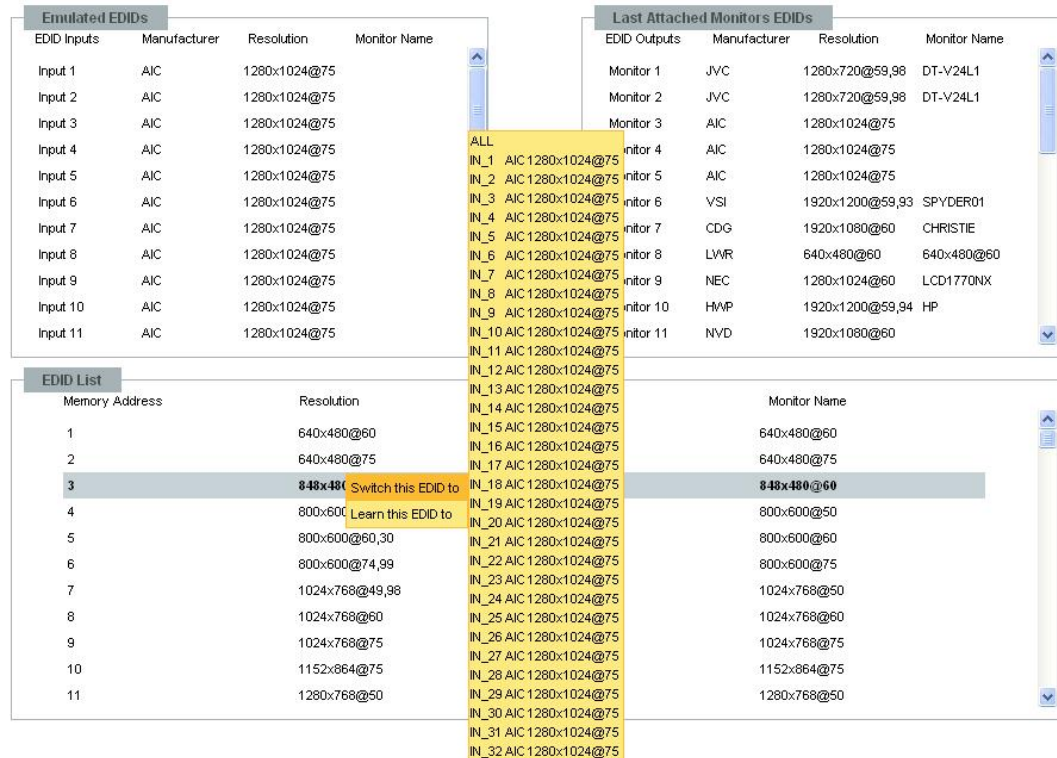
The **Emulated EDIDs** window contains the resolutions and the vendor names of the EDID reported to the PC for each input separately. The **Last attached Monitor's EDIDs** window contains the resolutions and vendor names of the display devices connected to matrix switcher's output.

6.4.1 Change emulated EDID at one or all inputs

All EDIDs are enumerated in the **EDID list** window.

Step 1

Select the desired EDID from this list with a left mouse click, a popup menu appears.



Step 2

Right click the **Switch this EDID to** item. A popup menu appears with an input name list.

Step 3

Right click on the desired input, or on the **ALL** text. Now the EDID has been changed on selected input as the message box shows on the left corner.

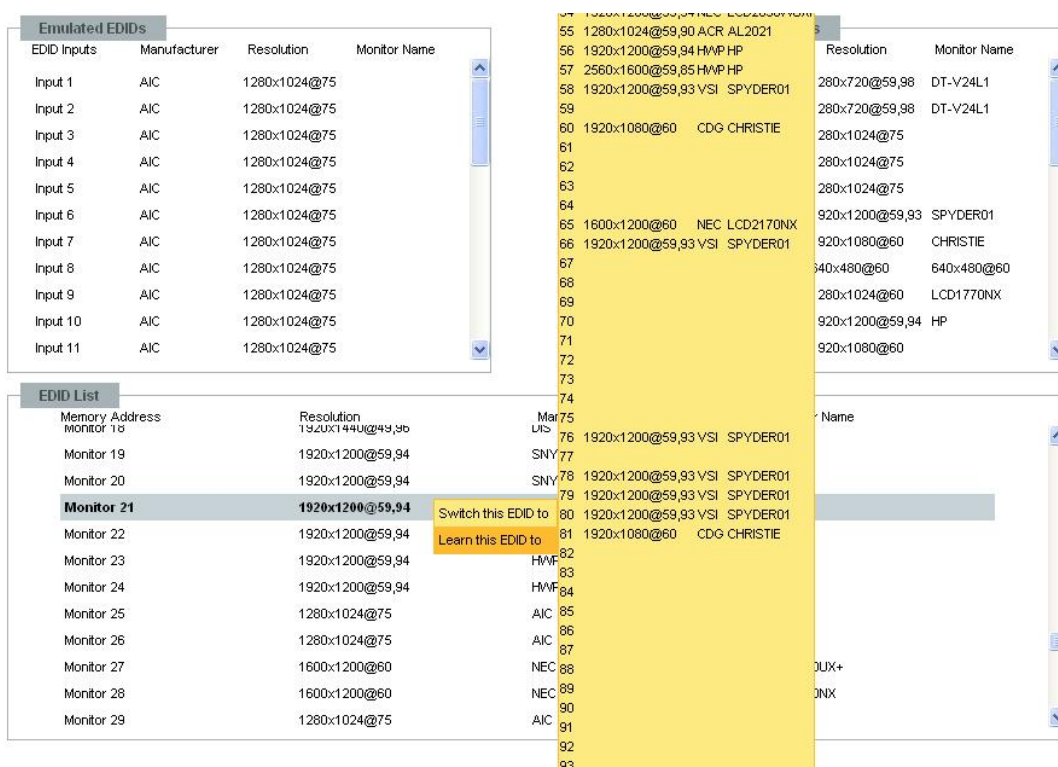
Info: switching to **ALL** inputs may take several seconds

Info: the user can switch and learn EDIDs also in the **Last Attached Monitors EDIDs** window

6.4.2 Learn EDID from attached display device

The matrix switcher can learn the EDID from the connected display device and store it in one of the user programmable memories. All the monitor's EDIDs are listed in the **EDID list** window, and also in the **Last Attached Monitors EDIDs** window.

Step 1 Right click the desired monitor's EDID from the list.



Step 2 Right click the Learn this EDID to submenu item. A popup window will show the memory locations from 50 to 100, that are available for the user.

Step 3 Right click on the desired memory location. The Web Manager refresh the lists in a few seconds, and a message box indicates the change.

6.5 Network Configuration

The unit's network values display when you select **Configuration->Network Settings**.

The following sections describe the configurable parameters on the Network Settings page.

Info:

It is possible to reload factory default IP setup from the front panel. To reload press CONTROL_LOCK button, press and hold OUTPUT_LOCK button and press LOAD PRESET button. TAKE, LOAD PRESET and SAVE PRESET buttons will blink, and after a short while the router will beep. The router has reloaded its default IP setup (IP address: 192.168.254.254, SUBNET MASK: 255.255.0.0)

6.5.1 Automatic IP Address Configuration

The matrix switcher supports three of the most used automatic IP configuration protocols.

To assign IP address automatically:

- | | |
|---------------|---|
| Step 1 | Click on Configuration menu |
| Step 2 | Select Network Settings |
| Step 3 | Select Obtain IP address automatically |
| Step 4 | Enter the following (as necessary): |

BOOTP	Select Enable to permit the Bootstrap Protocol (BOOTP) server to assign the IP address from a pool of addresses automatically.
DHCP	Select Enable to permit the Dynamic Host Configuration Protocol (DHCP) server to assign leased IP address to the matrix unit automatically.
AutoIP	Select Enable to permit the matrix to generate an IP in the 169.254.x.x address range with Class B subnet.

Info:

Disabling BOOTP, DHCP, and AutoIP (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.

When you are finished, click **Apply Settings** button

Info: To continue using the Web Manager, you must type in the IP address to the browser.

6.5.2 Static IP address configuration

The user can manually assign an IP address to the unit, and enter related network settings.

To assign an IP address manually:

- Step 1** Click on Configuration menu
- Step 2** Select Network Settings
- Step 3** Select Fix IP Configuration
- Step 4** Enter the following (as necessary):

IP Address	If DHCP is not used to assign IP addresses, enter it manually in decimal-dot notation. The IP addresses must be set to a unique value in the network.
Subnet Mask	A subnet mask defines the number of bits taken from the IP address that are assigned for the host part.
Default Gateway	The gateway address, or router, allows communication to another LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the matrix. The gateway address must be within the local network.

When you are finished, click **Apply Settings** button

Info: To continue using the Web Manager, you must type in the IP address to the browser.

6.5.3 Loading the default IP settings

- Step 1** Click on the Load Default button. Now the factory default IP address, Subnet Mask and Gateway address is loaded into the input boxes. But they are not saved.
- Step 2** To save the settings, click on Apply Settings button.

6.5.4 TCP Port Configuration

The user can configure the TCP port number, which is used to communicate with the matrix router through LAN. The input box initially contains the current setting.

- | | |
|---------------|--|
| Step 1 | Type the desired TCP port number into the input box |
| Step 2 | Press the Apply Settings button. The new port will be active after the next connection. |

The screenshot displays a web-based configuration window titled "TCP Port Configuration". Inside the window, there is a label "TCP port number:" followed by a text input field containing the value "10001". Below the input field, there are two buttons: "Load Default" and "Apply Settings".

6.5.5 Loading the default TCP Port settings

- | | |
|---------------|--|
| Step 1 | Click on Load Default button. Now the factory default value is in the input box, but it is not saved. |
| Step 2 | To save, click on Apply Settings button. The new port will be active after the next connection. |

7 Advanced EDID Management: using EDID Router

Each DVI sink (eg. monitors, projectors, plasma displays, switcher inputs) must support the EDID data structure. Source BIOS and operating systems are likely to query the sink using DDC2B protocol to determine what pixel formats and interface is supported. DVI standard makes use of EDID data structure for the identification of the monitor type and capabilities. Most DVI sources (VGA cards, set top boxes, etc) will output DVI signal after accepting the connected sink's EDID information. In case of EDID readout failure or missing EDID the source will not output DVI video signal.

7.1 Why is EDID management necessary?

All DVI sources must read attached sink's EDID data (switcher input, monitor input, etc.) before starting the DVI signal transmission. If no EDID is available, most sources will not output the signal. Unlike in standard analog VGA graphics cards, DVI graphics cards do not allow to be forced from Windows desktop/properties/settings tab to different pixel resolutions. Only those resolutions and refresh rates are allowed, which are defined in EDID data.

To provide proper EDID data for DVI sources MX32x32DVI-Pro has an Advanced EDID Manager, that can manage the emulated EDID on its all inputs indpendently. EDID can be managed using Lightware Matrix Controller software from a PC computer or Laptop through RS232 connection or Ethernet port. Emulating the right EDID information helps the user and installation engineer to control overall system's signal properties

EDID emulating options are:

Memory EDID emulation: static EDID emulation from factory preset memory (50 EDID from 01 to 50). The selected EDID is emulated at the desired (or all) DVI inputs.

User memory EDID emulation: static EDID emulation from user preset memory (50 memory locations from 51 to 100) The selected EDID is emulated at the desired (or all) DVI inputs.

Dynamic EDID emulation3 copying and emulating EDID from one of attached display devices The EDID of the attached display device (projector, moitor, etc) is emulated on the desired input. If the display is changed, and new device is attached, the EDID on selected inputs will automatically be changed according to the new display.

With EDID Router function the user is able to store EDID from any attached monitor to one of the user programmable memories, to download EDID from file to user memory, and to upload EDID from the router to file.

Info **User must not disconnect DVI cables to change an EDID opposite to other manufacturer's products. EDID can be changed even if source is connected to the input and powered ON .**

Info **When EDID has been changed, the router toggles the HOTPUG signal for 200 msec. Some graphic cards or DVD players do not sense the hotplug signal, and there can be happen, that even if EDID has been changed, the new set resolution is not affected. This case the source device must be restarted, or powered OFF and ON again.**

7.2 About Advanced EDID Management

EDID router contains a 164 block non volatile memory bank. EDID List is structured as follows:

1..50Factory Preset EDID list
 51..100User programmable memories
 101..132 (DVI_OUT_1...32)Last attached monitor's EDID list
 133..164 (DVI_IN_1...32)emulated EDID at input connectors

All EDID (including factory preset; user programmable memories; EDID at other inputs; and EDID at outputs) can be switched and emulated at any of the inputs

Info The first 50 EDID (1...50 inclusive) are factory preprogrammed and cannot be modified. These are the most commonly used resolutions.

Info MX32x32DVI-PRO and MX16x16DVI-Pro can handle both 128 Byte EDID and 256 Byte extended EDID structures.

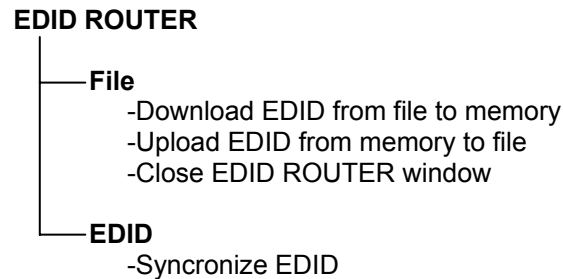
Info The attached monitor's EDID is stored automatically, until a new monitor is attached to that particular output. In case of powering the unit off, the last attached monitor's EDID remains in non volatile memory.

MEMORY	Resolution		MEMORY	Resolution
01	640x480@60 Hz		26	1600x1200@50 Hz
02	640x480@75 Hz		27	1600x1200@60 Hz
03	848x480@60 Hz 16:9		28	1920x1200@60 Hz
04	800x600@50 Hz		29	1920x1200@50 Hz
05	800x600@60 Hz		30	480i@59.94 Hz
06	800x600@75 Hz		31	640x480@59.94 Hz
07	1024x768@50 Hz		32	720x480p@60 Hz
08	1024x768@60 Hz		33	576i@50 Hz
09	1024x768@75 Hz		34	720x576p@50 Hz
10	1152x864@75 Hz		35	1280x720p@50 Hz
11	1280x768@50 Hz		36	1280x720p@60 Hz
12	1280x768@60 Hz		37	1920x1080i1 @50 Hz
13	1280x768@75 Hz		38	1920x1080i2 @50 Hz
14	1360x768@60 Hz		39	1920x1080i@60 Hz
15	1364x768@50 Hz		40	1920x1080p@24 Hz
16	1364x768@60 Hz		41	1920x1080p@25 Hz
17	1364x768@75 Hz		42	1920x1080p@30 Hz
18	1280x1024@50 Hz		43	1920x1080p1 @50 Hz
19	1280x1024@60 Hz		44	1920x1080p2 @50 Hz
20	1280x1024@75 Hz		45	1920x1080p@60 Hz
21	1366x1024@60 Hz		46	2048x1080p1 @50 Hz
22	1400x1050@50 Hz		47	2048x1080p2 @50 Hz
23	1400x1050@60 Hz		48	2048x1080p@60 Hz
24	1400x1050@75 Hz		49	
25	1680x1050@50 Hz		50	

Table4. - Factory Preset EDID list

7.3 EDID ROUTER MENU Description

EDID Router window contains following menus and submenus:



7.3.1 EDID menu

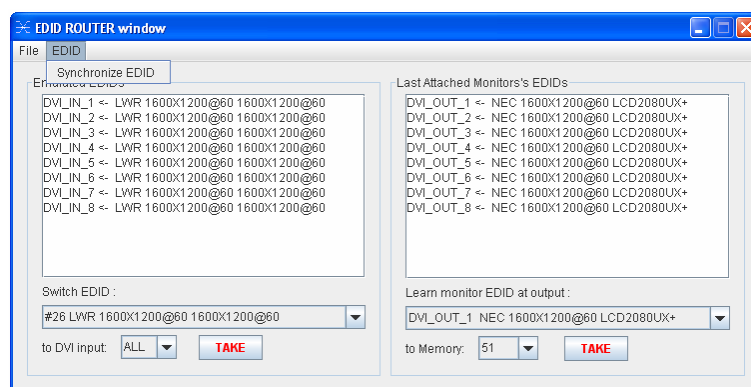
EDID menu contains 1 section:

Synchronize EDID

Selecting Synchronize EDID menu the Lightware Matrix Controller (PC) software rereads all EDID information from the connected MATRIX SWITCHER. During normal operation it is not necessary to use this menu item because the MATRIX SWITCHER always automatically reports every status change.

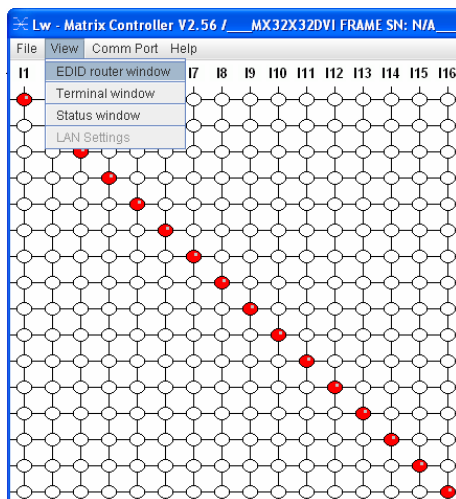
Info There is always a small delay in responses. So if a new monitor is connected to the output its new EDID is not shown immediately but in 2 seconds!

Info As the MATRIX SWITCHER reports status change nothing will happen if you select the same EDID to a given input or connect the same display device to a given output!



7.4 EDID Router operation

Select View->EDID router window

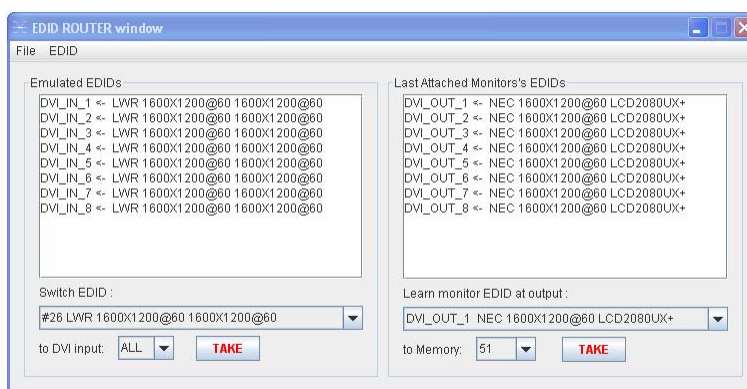


Info

After a successful connection all identifying information is shown under the Help menu.

The EDID ROUTER window appears and the software starts to synchronize EDID list with the Matrix switcher.

After synchronization process the current status of the MATRIX SWITCHER EDID are shown on the two text area. The Emulated EDID window contains the resolutions and the vendor names of the EDID reported to the PC for each input separately. The Last Attached Monitor's EDID window contains the resolutions and vendor names of the display devices connected to matrix switcher's output.

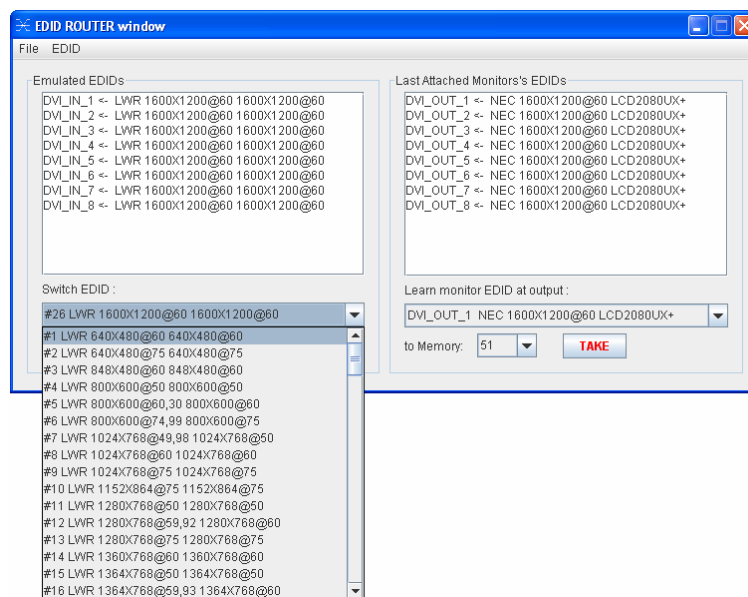


7.4.1 Change emulated EDID at one or all inputs

All EDID are enumerated in the switch EDID list. If you want to modify the current emulated resolution you can select one from this list. There is static EDID emulation or dynamic EDID emulation.

- Static EDID emulation means, when an EDID from memories 01..100 is selected and emulated at input(s)
- Dynamic EDID emulation occurs, when an attached monitor's EDID is emulated at input(s), simply copying the data from the monitor. This EDID changes automatically, if a new monitor is attached to the output.

Step 1. Select the desired EDID from Switch EDID list (from #1..100 through DVI_OUT_1 ..to DVI_IN_32)



Step 2. Select the input of the matrix switcher (or ALL inputs) where the desired EDID will be emulated

Step 3. Press TAKE button. Now the EDID has been changed on selected output(s). After selecting a new EDID from the *switch EDID* list, selecting a input (or the *ALL* item) and pressing the *TAKE* button the MATRIX SWITCHER will modify that (or all) input(s) EDID.

Info If a monitor's EDID was selected to emulate (DVI_OUT_1 to ..8) the emulated EDID will be changed all times on that input(s), when a new monitor was connected. If the monitor was disconnected from output, the latest EDID remains, it will not be deleted from the input. This feature helps especially rental technicians or system integrators to keep the source continuously transmitting the signal, and adopt the system for new incoming display devices.

Info Power ON/OFF cycle will not effect the emulated EDID or other settings.

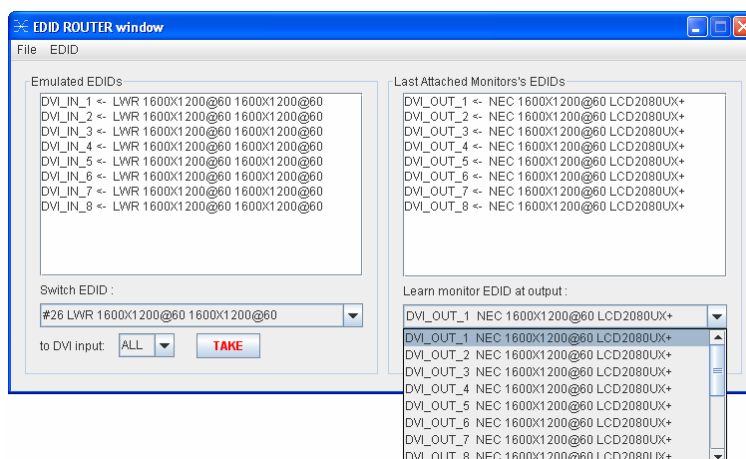
Info EDID switch procedure causes a status change and hence it is reported back to the CONTROL SOFTWARE within 2 seconds.

7.4.2 Learn EDID from attached display device

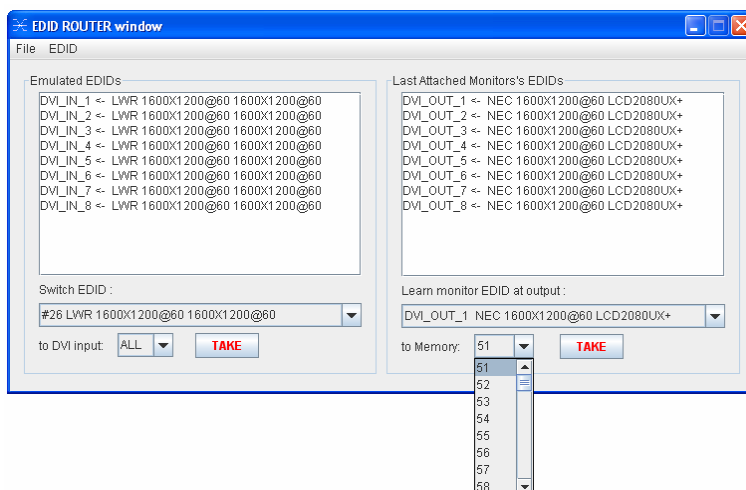
The MATRIX SWITCHER can learn the EDID from the connected display device and store it in one of user programmable memory.

All EDID is enumerated in the „*Learn monitor EDID at output*” list according to the router's outputs.

Step 1. Select the desired display's EDID from the list.



Step 2. Choose a memory location from the *to Memory* list where the EDID will be stored. Only memories 50...100 are available for user.

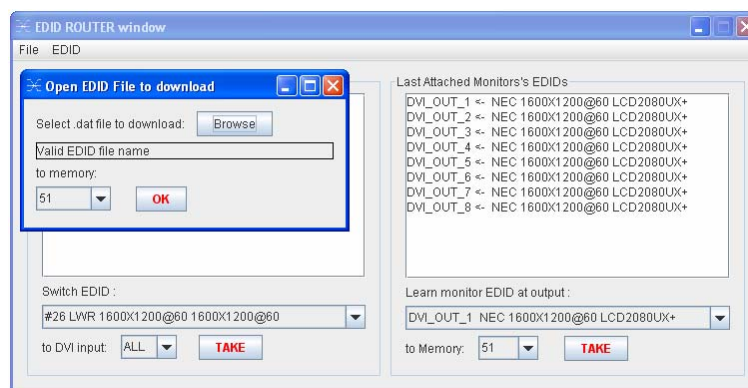


Step 3. Press TAKE button. Now the EDID is stored in Matrix non volatile memory. This procedure causes a status change and hence it is reported back to the MATRIX CONTROL SOFTWARE within 2 seconds

7.4.3 Download EDID from file to memory

The MATRIX SWITCHER is able to learn and store EDID from attached PC computer. EDID is stored in *.dat files.

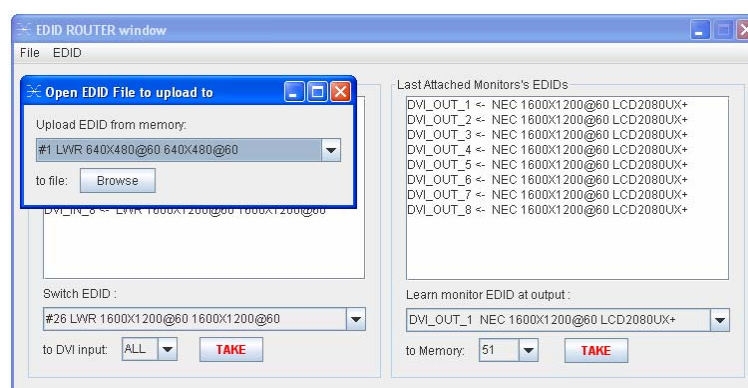
- Step 1.** Select File-> Download EDID from file to memory.
- Step 2.** In the pop-up window browse your hard drive to find EDID file. The software checks if the selected file is a valid EDID file, than continue with step 3.
- Step 3.** Select a memory location to store the selected EDID. Press 'OK' button. After it was accomplished "Download Ready" message appears.



7.4.4 Upload EDID from memory to file

The CONTROL SOFTWARE can upload EDID from the MATRIX SWITCHER, and save it as an EDID file.

- Step 1.** Select File-> Upload EDID from memory to file.
- Step 2.** From the pop-up window choose the EDID memory you want to save to file.
- Step 3.** Click Browse, add a file name and path and click Save. If upload was successful, an "Upload Ready " message confirms the command.



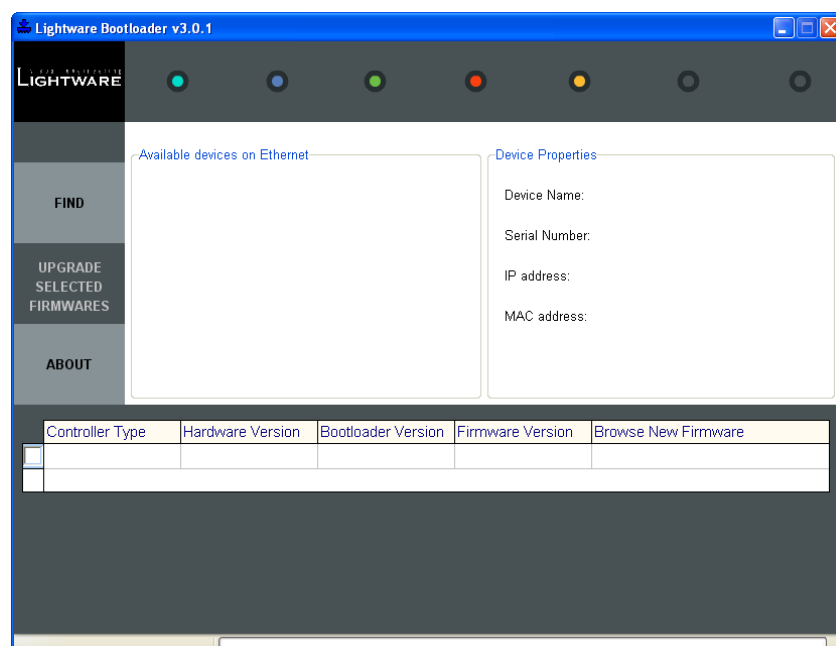
8 Firmware upgrade

Using Lightware bootloader application to upgrade router's firmware

The matrix router can only be updated via LAN, so connect the matrix router to the local subnet. The router is DHCP enabled so it will get an IP address automatically, or if you do not have DHCP server, it will get an AUTO IP address from the AUTO IP domain.

Run "Installer_LW_bootloader_v3_0_1.exe"

Run the application from StartMenu->Programs->Lightware->LW_bootloader_v3_0_1-> LW_bootloader_v3_0_1.

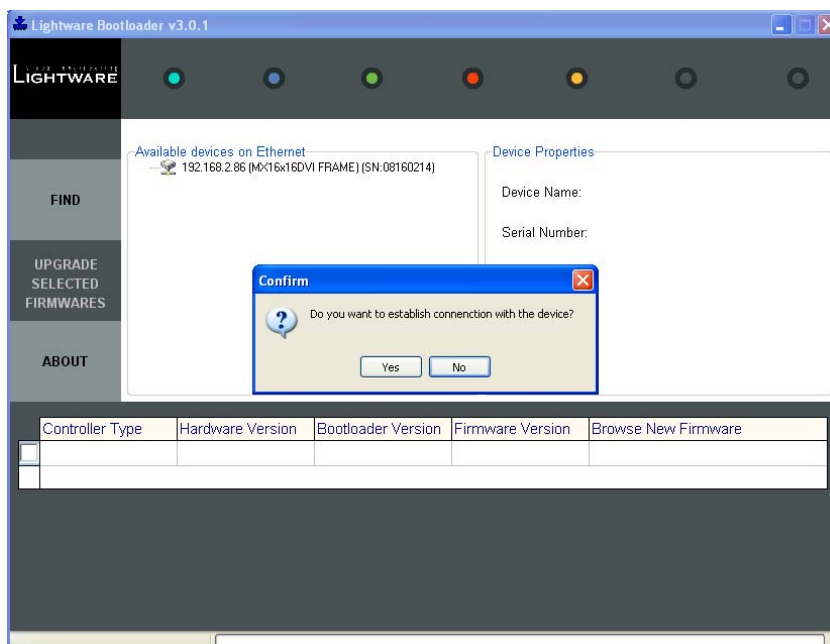
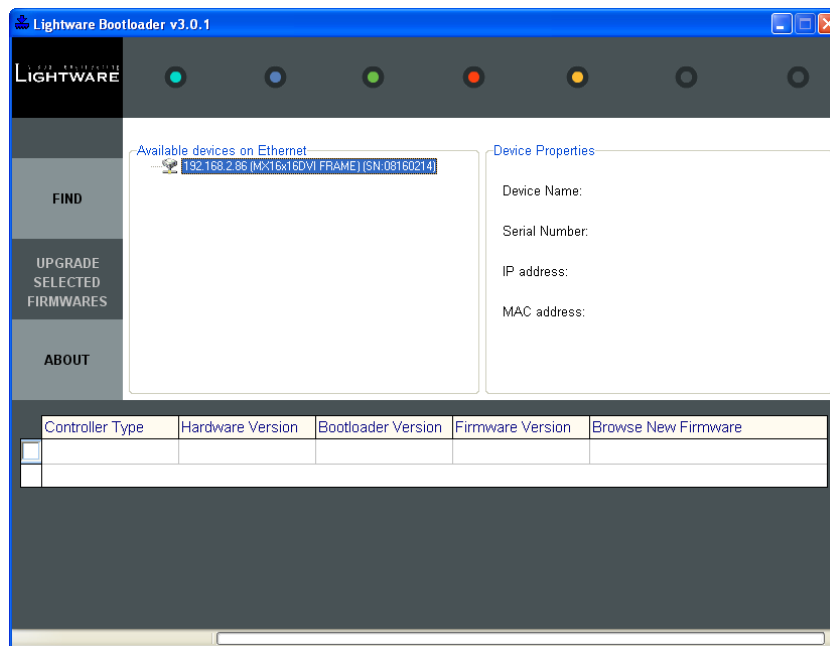


Click "**FIND**" Button. If the bootloader finds one or more routers their IP addresses will be listed in the tree view window. On the tree view, device type and serial number is shown after the IP address. Double click on the IP address, then click "YES" to establish connection with the matrix router. It will take 10-15 secs to get all information from the router.

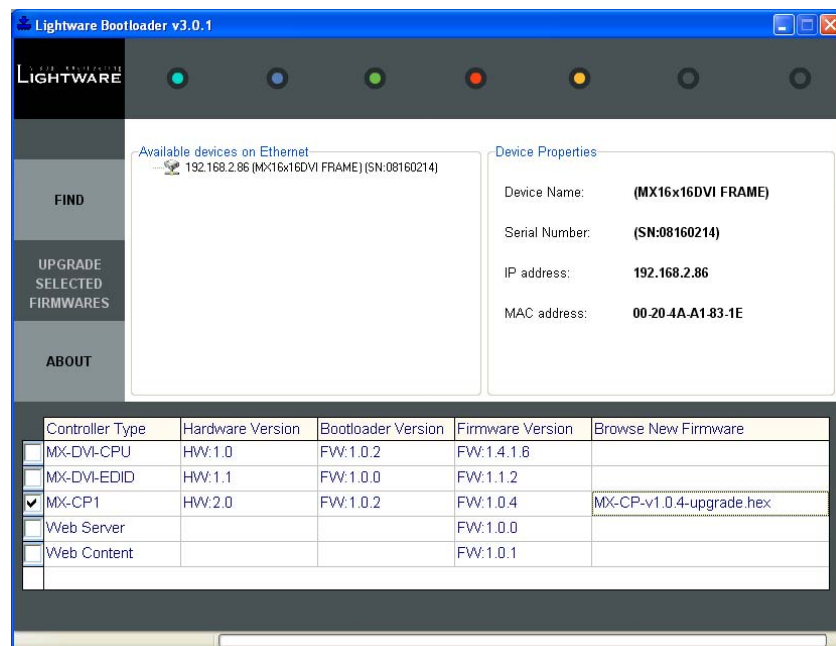
Info

Note, that you must wait until all the devices on the network completely start up, before pressing FIND button.

The bootloader application will reset the router during the firmware upgrade.

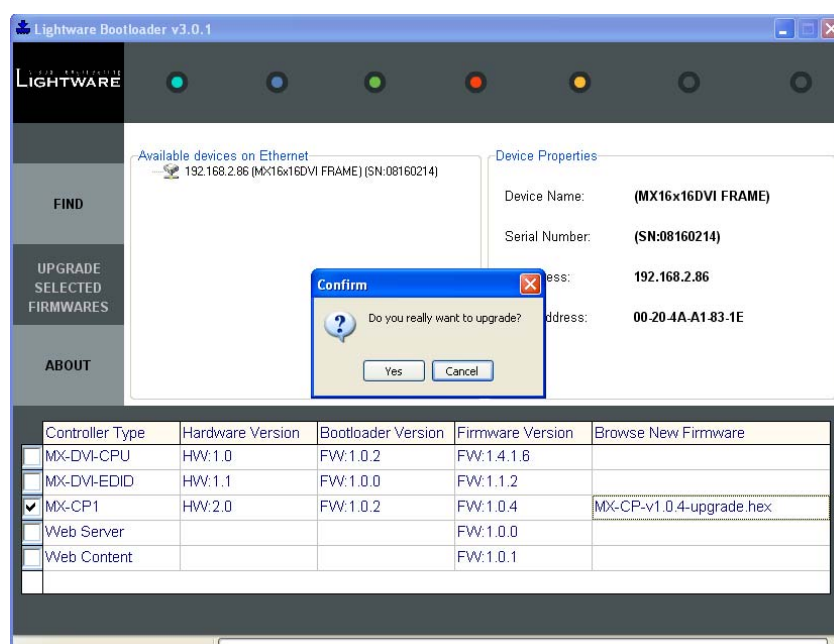


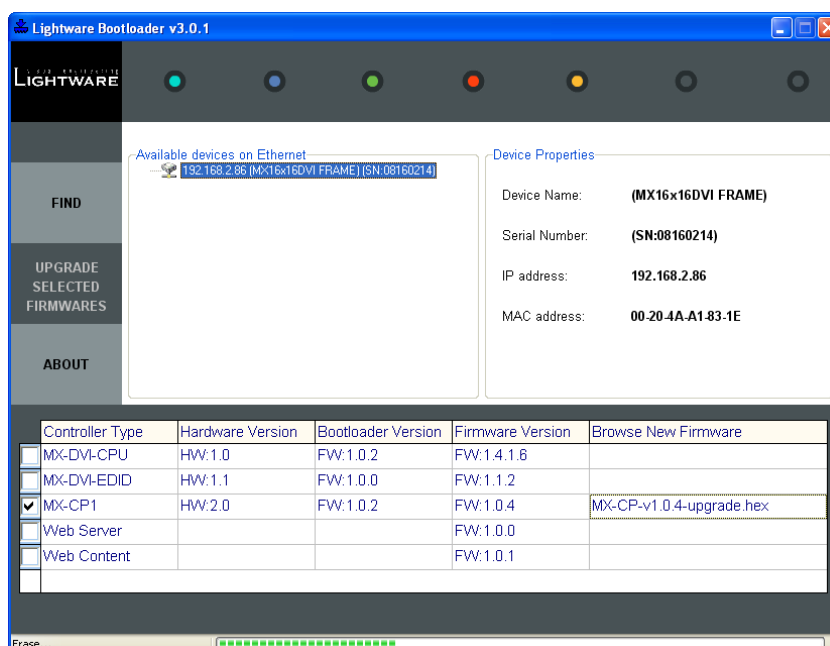
Select the controller(s) that need(s) new firmware by clicking the checkbox next to it. An open file dialog will pop up if you click on the last cell of the appropriate row. Now you can browse for the new firmware file to upload. After opening the new file, the new firmware field will contain the name of the firmware file.



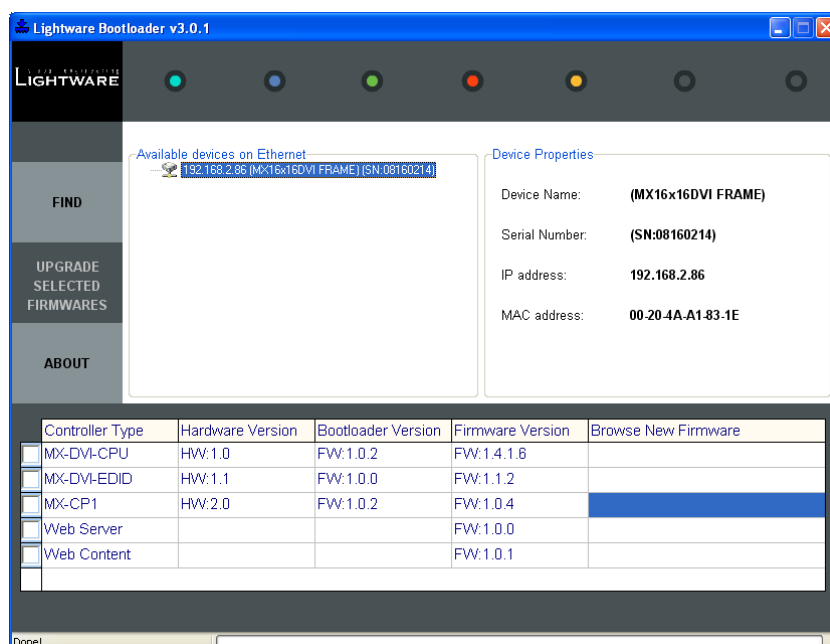
Click "UPDATE SELECTED FIRMWARES" button. The router is being reprogrammed after clicking on "YES" button, with the firmware you selected. If you select a file that doesn't fit for the selected controller, you will get an information message about which file is wrong. If you selected a controller to upgrade, but you had not selected a file for it, then you will also get an information message about which file is missing.

Info: The reprogramming time will vary between 3-8 mins per controllers to be reprogrammed.





When the firmware upgrade is done, you will get the following window:



When all upgrades are done, you can close the connection with the last device, by closing the application, or you can select another matrix router to upgrade. After closing the bootloader application, switch the upgraded devices off and then on. Now the router is ready to be used with the new firmware.

Info:

After closing the bootloader application the router will reset!

9 Specifications

Inputs (MX-DVID-IB)

DVI input signals8x DVI single link / input board
 Connectors24 pole DVI-D digital only
 Auto equalization:Yes, max 40dB at 825 MHz
 Input cable equalization:50 meter 24AWG cable at 1.65 Gbps
 EDIDYes for each input connector

Signal

Data rate:all between 25 Mbps and 1.65 Gbps /colour
 Channels:1x TMDS Clock + 3x TMDS Colours
 Resolutions:all between 640x480 and 1920x1200@60Hz
 Colour depth:24 bits, 8 bit/colour
 HDTV resolutions:720p, 1080i, 1080p
 HDCP compliant:No
 Signal latency (from input to output)180 nanoseconds

Resolution	Vertical frequency (Hz)	Horizontal frequency (KHz)	Pixel Clock frequency (MHz)	Comment
640x480	60.00	31.47	25.18	DOS VGA
800x600	60.32	37.88	40	VESA SVGA
800x600	75.00	46.87	49.5	VESA SVGA
832x624	74.55	49.72	57.29	MACINTOSH
1280x720	60.00	45.00	74,25	HDTV 720p
1024x768	60.00	48.36	65	VESA XGA
1024x768	75.00	60.02	78.75	VESA XGA
1360x768	47.7	60.00		WIDE-XGA
1152x870	75.06	68.68	100	MACINTOSH
1280x1024	75.00	80.00	135.00	VESA SXGA
1400x1050	60.00	65.64	121.82	SXGA+
1920x1080	60.00	67.50	148.5	HDTV 1080p
2048x1080	60.00	67.50	157.3	2K
1600x1200	60.00	75.00	162	VESA UXGA
1920x1200	60.00	75.00	162	VESA

Table5. - DVI timing examples for some typical supported resolutions

Outputs (MX-DVID-OB)

DVI output signals8x DVI single link / output board
 Connectors24 pole DVI-D digital only
 Output preemphasisNo
 +5V output current500mA continuous each

Control

Front Panel buttonsYes, 21 buttons
 Serial Port9pole Dsub Female RS232 or RS422
 Command Execution delay RS232 port47 milisec
 Baud rate9600 Baud, 8 bit, 1stop bit, no parity
 Ethernet port:RJ 45 female connector
 Ethernet protocolTCP/IP, UDP/IP, ARP, ICMP, SNMP, TFTP, Telnet, DHCP,
 BOOTP, HTTP, and AutoIP

General

Power 100-240 V AC 50/60 Hz 3 A
 ComplianceCE, UL, FCC
 EMI/EMCEN 55103-1, EN 55103-2
 SafetyEN 60065 Class I
 Warranty 3 years

MX16x16DVI-Pro

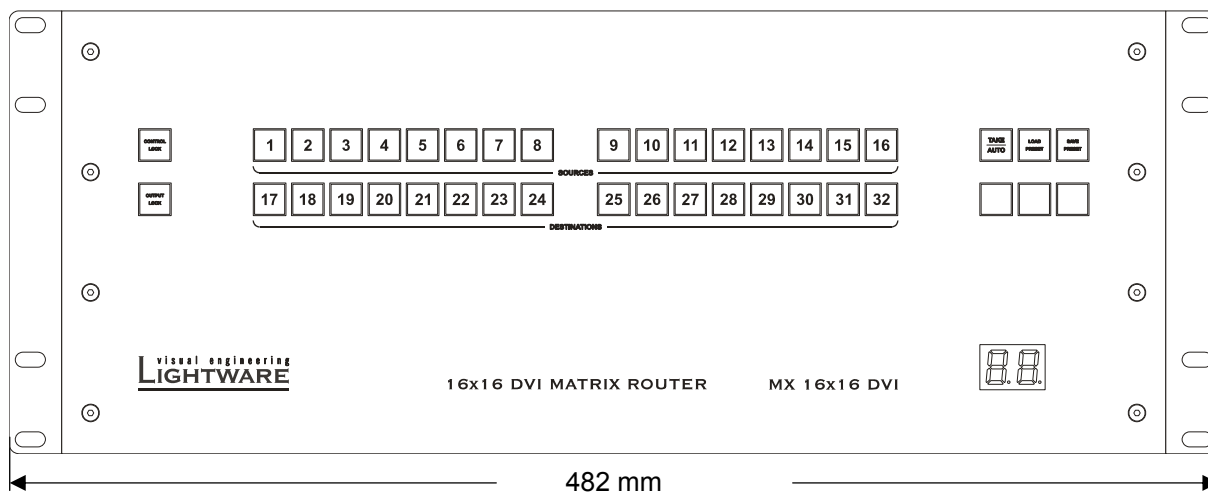
Rack mountYes, 4U high
 Enclosure Metal
 Enclosure dimensions176.5 mm H x 446 mm W x 302 mm D
 Weight NET11.5 kg

MX32x32DVI-Pro

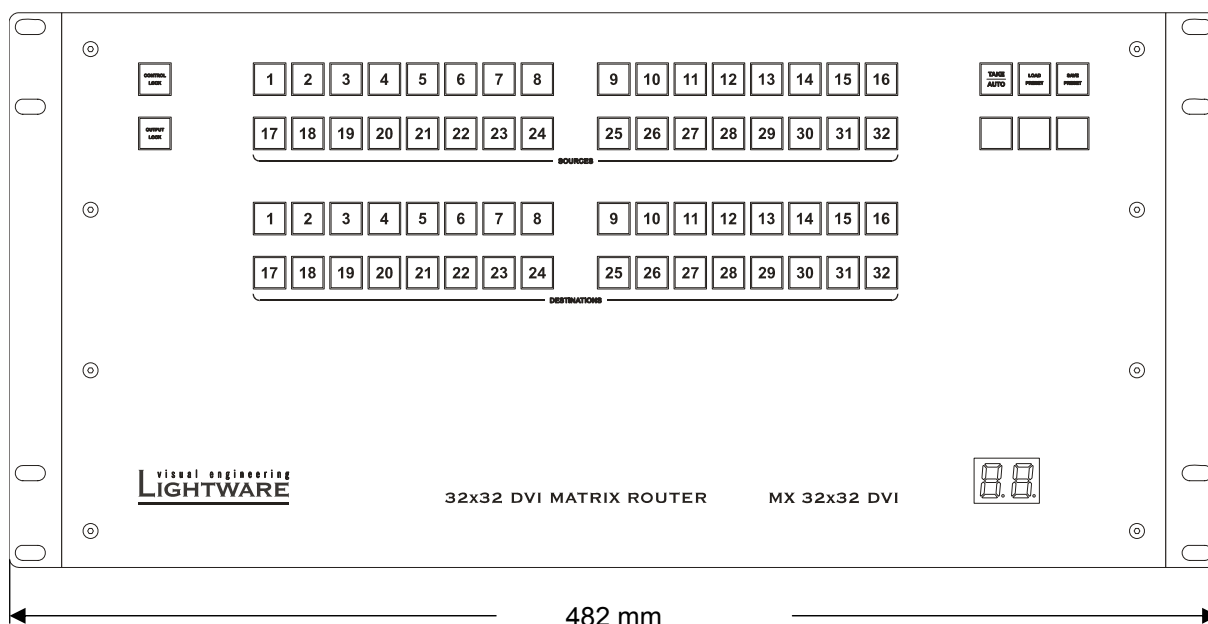
Rack mountYes, 5U high
 Enclosure Metal
 Enclosure dimensions221 mm H x 446 mm W x 302 mm D
 Weight NET 13.5 kg

9.1 Mechanical Drawings

9.1.1 Mechanical Drawings – Front View

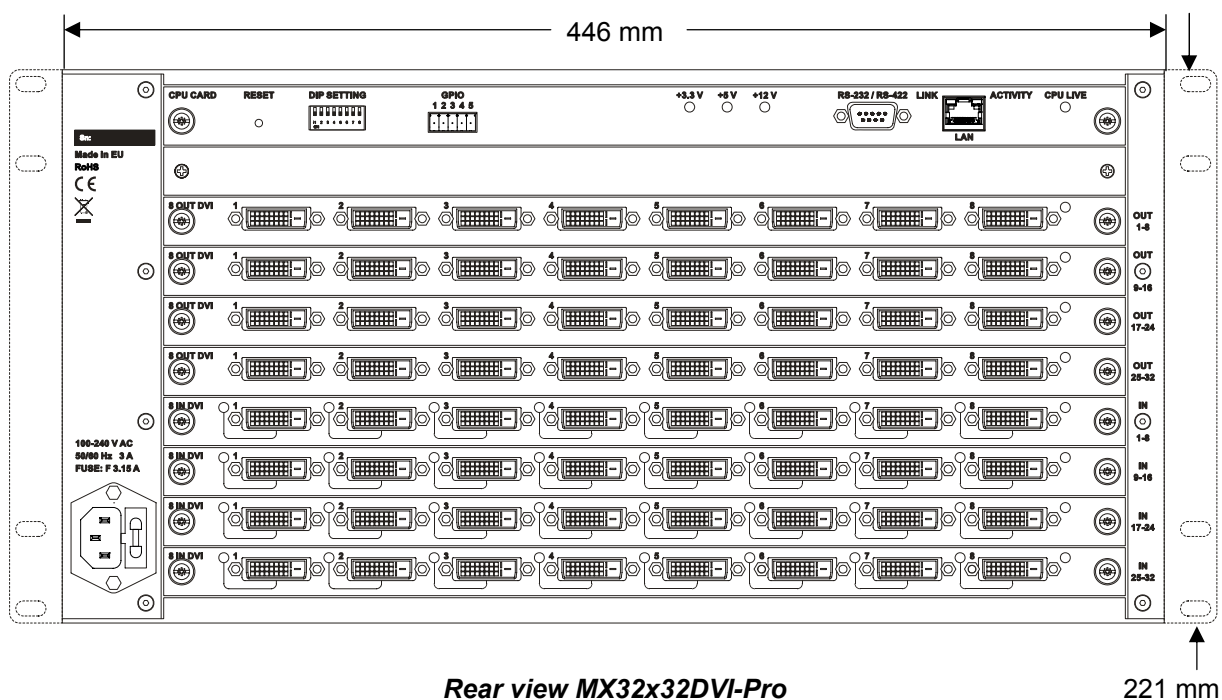
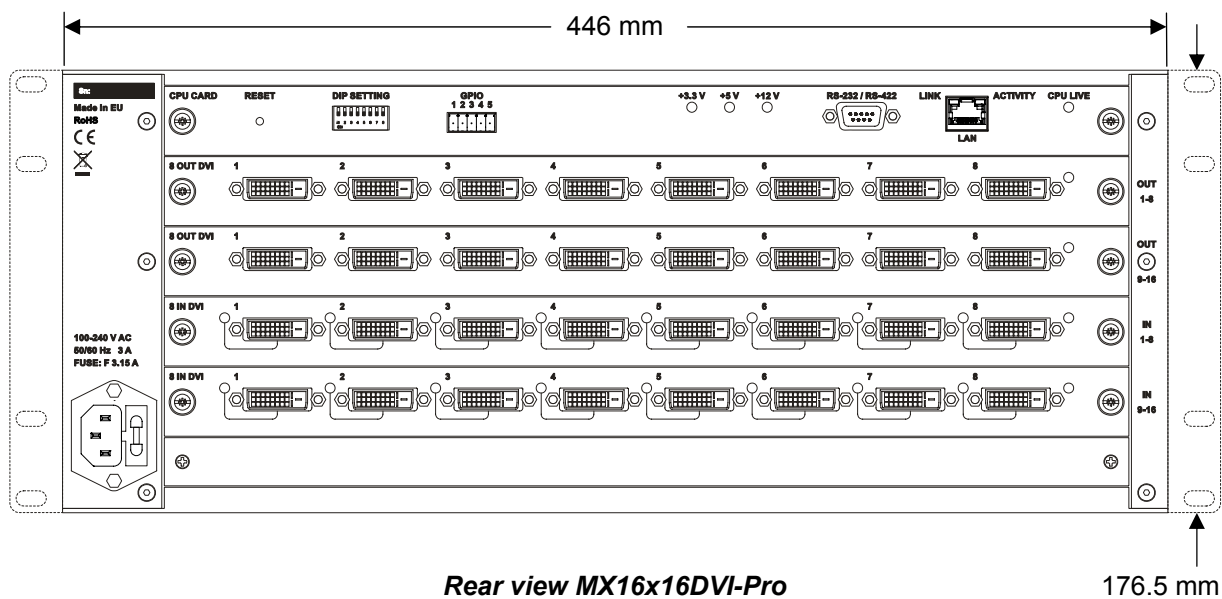


Front view MX16x16DVI-Pro

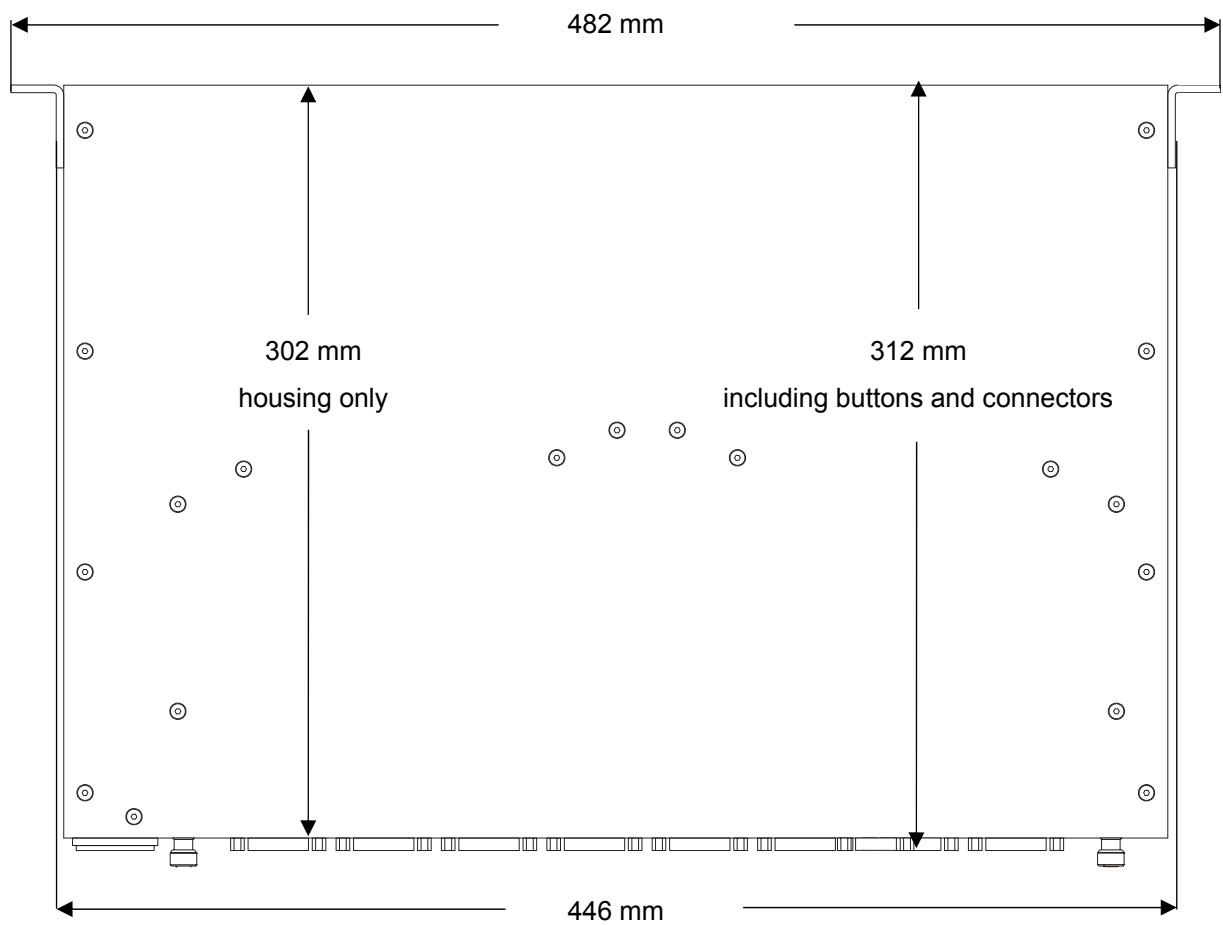


Front view MX32x32DVI-Pro

9.1.2 Mechanical Drawings – Rear View

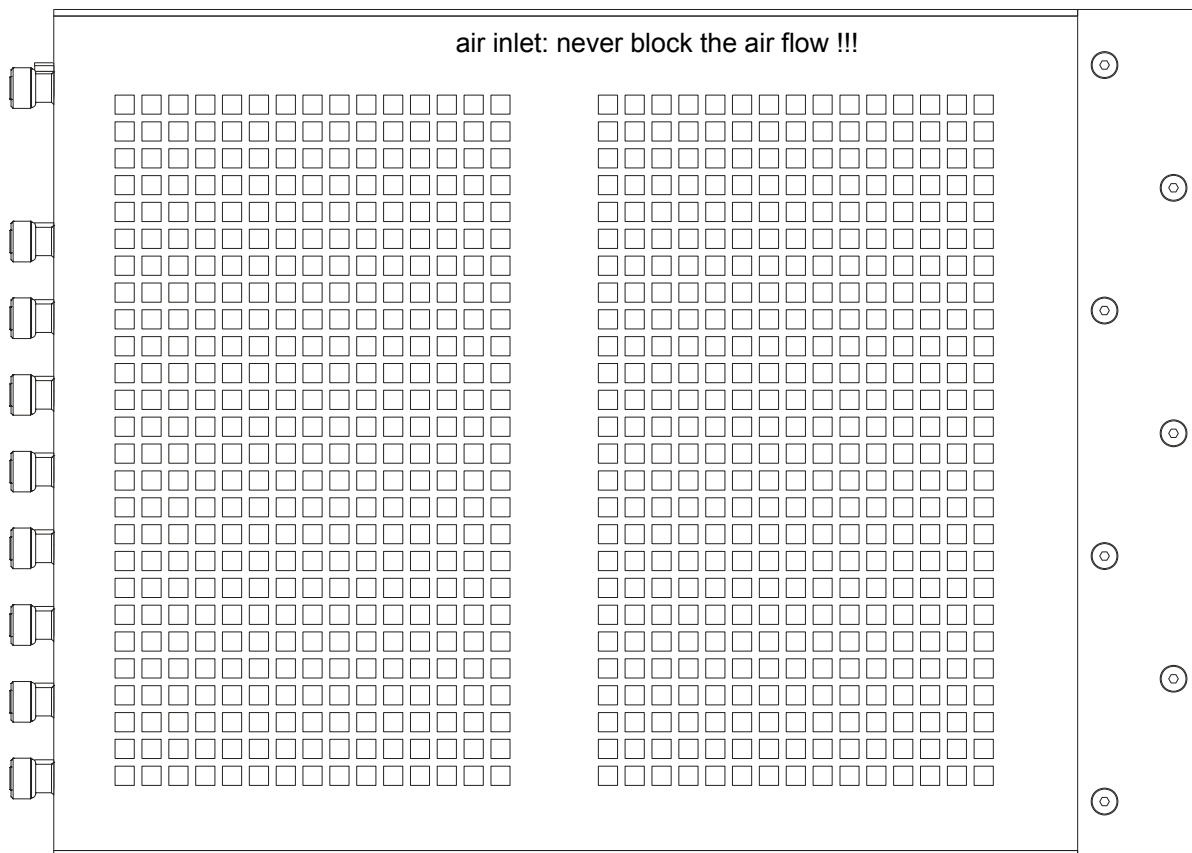


9.1.3 Mechanical Drawings – Top View

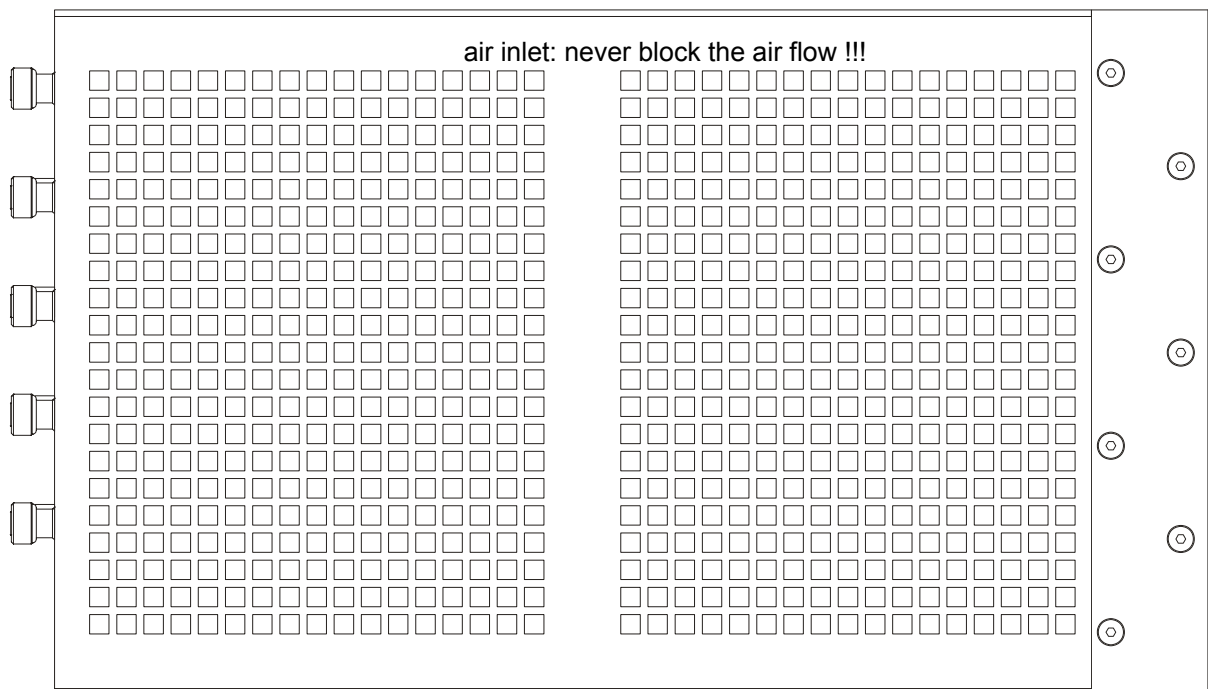


Top view MX16x16DVI-Pro and MX32x32DVI-Pro

9.1.4 Mechanical Drawings – Left View

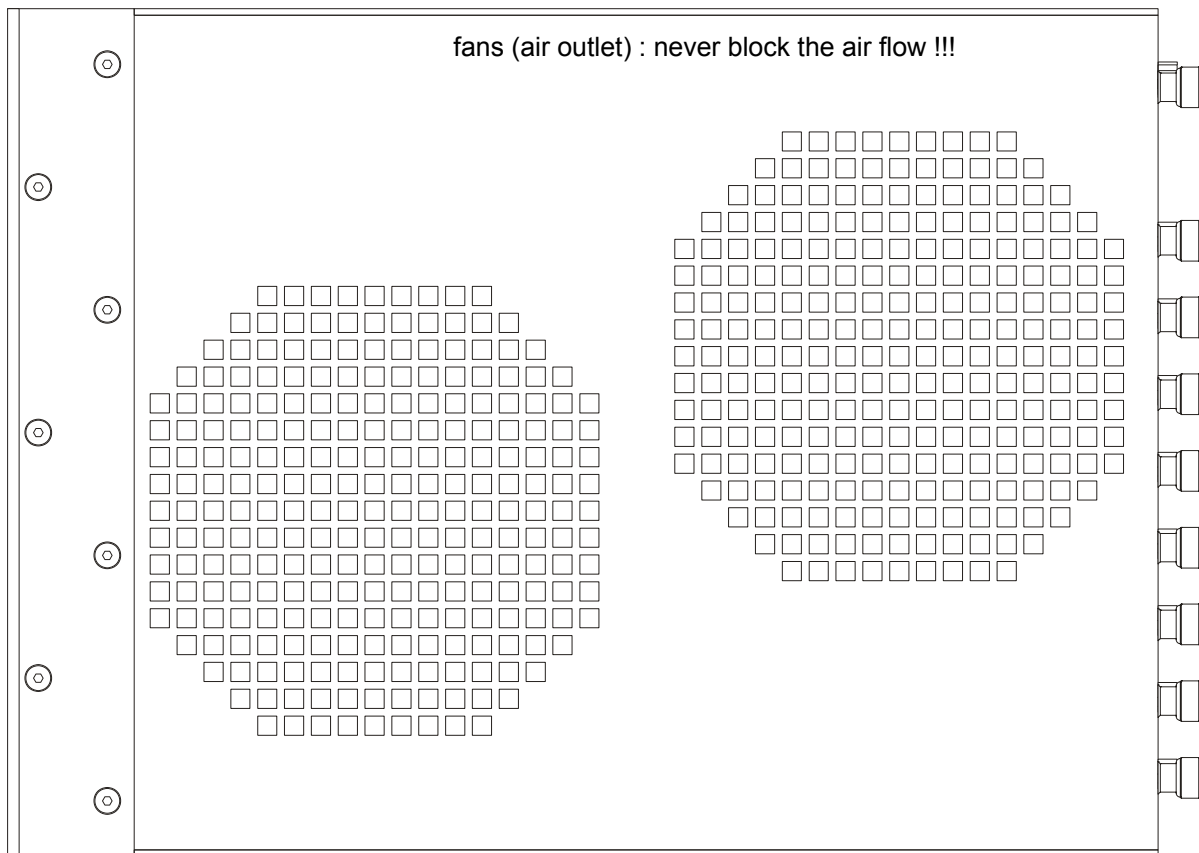


Left view MX32x32DVI-Pro

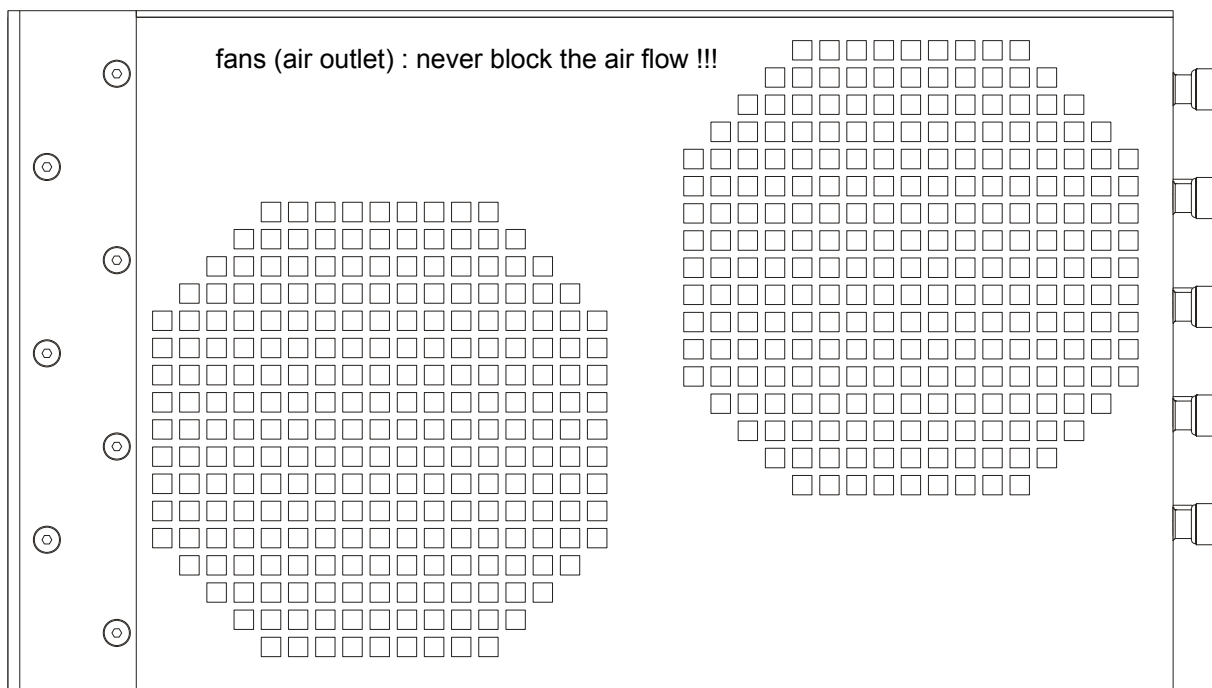


Left view MX16x16DVI-Pro

9.1.5 Mechanical Drawings – Right View



Right view MX32x32DVI-Pro



Right view MX16x16DVI-Pro

10 Warranty

Lightware Visual Engineering warrants this product against defects in materials and workmanship for a period of three years from the date of purchase.

The customer shall pay shipping charges when unit is returned for repair. Lightware will cover shipping charges for return shipments to customers.

In case of defect please call your local representative, or Lightware at

Lightware Visual Engineering
1071. Budapest Peterdy str. 15, HUNGARY

Tel.: +36 1 889 6177

Fax.: +36 1 342 9903

E-mail: support@lightware.hu

11 Quality Check Record

Model name	Serial number	Date of manufacture	Checked

11.1 Hardware

Card	HW	FW
PSU		
IN1		
IN2		
IN3		
IN4		
OUT1		
OUT2		
OUT3		
OUT4		

Card	HW	FW
CPU		
EDID MGMT		
Control P #1		
Control P #2		
Mother BRD		
SUBNET		
MAC ADDR		
IP ADDR		

11.2 Electrical check

GND/EARTH Safety	<input type="checkbox"/>	Inputs	<input type="checkbox"/>
+3.3V; +5V; +12V	<input type="checkbox"/>	Input LED's	<input type="checkbox"/>
CPU Live	<input type="checkbox"/>	Outputs	<input type="checkbox"/>
Fan1 & Fan2	<input type="checkbox"/>	RS-232	<input type="checkbox"/>
Buttons	<input type="checkbox"/>	LAN	<input type="checkbox"/>